BULLETIN

OF

THE JOHNS HOPKINS HOSPITAL.

Volume II.—No. 11.] BALTIMORE, FEBRUARY-MARCH, 1891. [Price, 15 Cents.

CONTENTS.

	PAGE.
The Etiology of Diptheria. By Professor W. H. Welch and Dr. A. C. Abbott,	25–31
Instruction in Hygiene,	31
Cirrhosis Hepatis Anthracotica. By Professor W. H. Welch,	32–33
Notes on New Books,	33
Syphilis of the Lung. By W. T. Councilman, M. D.,	34–37
Report of Cases Treated by Koch's Method. By Dr. Morison,	38–39
Hospital Journal Club,	44
Proceedings of Societies:	
Hospital Medical Society,	40–44
Cirrhosis of the Liver with Glomerulo-Nephritis [Dr. Councilman];—Obstruction of the Superior Vena Cava [Dr. Osler];—A Case of Abdominal Tuberculosis [Dr. Booker];—Cases of Perforating Ulcers [Dr. Thomas];—Report of Cases of Alcoholism [Dr. Latimer];—Exhibition of Specimens [Dr. Robb];—Exhibition of Specimens [Dr. Councilman];—Twin Pregnancy—Breech and Transverse Presentation—The Placentae and the Membranes [Dr. Kelly.]	

THE ETIOLOGY OF DIPHTHERIA.[1]

By Professor William H. Welch, M. D., and Alexander C. Abbott, M. D.

In 1884 Löffler, in an article published in the second volume of the *Mittheilungen aus dem Kaiserlichen Gesundheitsamte*, concluded from the bacteriological examination of a large number of cases of diphtheria that a species of bacillus found by him frequently in diphtheritic membranes and carefully studied in its morphology and biology, and identified with the one described the previous year by Klebs, is the only one present which can be supposed to be of pathogenetic importance. He expressed himself, however, for several reasons with commendable reserve as to the etiological significance of this bacillus. Subsequent researches of a large number of investigators have removed one by one the doubts which Löffler had expressed until at the present time nearly all bacteriologists are convinced that the Klebs-Löffler bacillus is the specific cause of primary diphtheria. As the results reached by these various investigators have been summarized not long since by Löffler,[2] it is not necessary to describe them here in detail. It will suffice to mention the names of Babes, d'Espine, v. Hoffmann, Ortmann, Roux and Yersin, Kolisko and Paltauf, Zarniko, Sörensen, Escherich, Klein. Since the publication of Löffler's critical review in 1890, the most important contributions have been the investigations of the toxic albumens produced in cultures of the diphtheritic bacillus by Fränkel and Brieger, and the experimental production of immunity against inoculation with the diphtheritic bacilli or their poisonous products by Fränkel and by Behring.[3]

By these investigations it has been determined that the Klebs-Löffler bacillus is present in all cases of primary diphtheria in the diphtheritic deposits, that it does not invade the blood or organs or even the mucous membrane affected, that in susceptible animals the disease can be reproduced in all its features, even to the production of paralysis, that the constitutional symptoms, the paralysis and the changes peculiar to diphtheria in internal organs are caused by a toxic albuminous substance or substances which have been separated in a condition approaching purity and which are produced by the local action of the bacilli in inoculated animals as well as in cultures, and that by various methods a greater or less degree of immunity can be artificially conferred upon susceptible animals and that under certain conditions susceptible animals can be cured after inoculation with virulent cultures.

In view of these convincing results it might be thought unnecessary to publish any further observations upon the bacteriological examination of cases of diphtheria; but Löffler, in the critical review mentioned, has called attention to the apparently discordant observations which have been made in this country by Prudden. In 24 cases of diphtheria in children examined by Prudden[4] he failed to find in a single instance, either by microscopical examination of the membranes or by cultures, the Klebs-Löffler bacillus. Recognizing the thorough competence of Prudden as a bacteriologist, Löffler says, "I do not believe that in North America a form of diphtheria prevails different from that with us. With us the bacilli are found regularly by every investigator, there they are constantly missed. Further investigations must and will clear up this contradiction." And he concludes his article with the sentence, "A simple 'Liquet' can not be affirmed until investiga-

[1] The results of the investigations reported in this paper were communicated to the Johns Hopkins Hospital Medical Society at the meetings held June 2nd, 1890, and January 9th, 1891.

[2] Löffler. *Der gegenwärtige Stand der Frage nach der Entstehung der Diphtherie. Deutsche Med. Wochenschrift*, 1890, Nos. 5 and 6.

[3] Fränkel and Brieger, *Berliner Klin. Wochenschrift*, 1890, Nos. 11 and 12. Fränkel, *Berliner Klin. Wochenschrift*, 1890, No. 49. Behring, *Deutsche Med. Wochenschrift*, 1890, No. 50.

[4] Prudden. *Am. Jour. of the Med. Sciences*, April and May, 1889.

tions inconsistent with this, such as those of Prudden in North America, have been shown to be erroneous."

We consider that the excellence of his methods, his well known thoroughness and accuracy and his well deserved reputation as a bacteriologist, give to the results published by Prudden the greatest weight. Nor do we regard it necessary to demonstrate that his observations are erroneous as suggested by Löffler. In the estimation of his results the following points mentioned in his article ought to be considered. All but two of the twenty four cases occurred in children's asylums or hospitals, 16 being in a large foundling asylum in which measles and scarlatina were prevalent. In 7 cases the diphtheria complicated or was preceded by measles, in 3 by scarlatina, in 1 by whooping cough, in 4 by phlegmonous or erysipelatous inflammation, and in only 9 was the diphtheria apparently uncomplicated by notable previous disease; 4 cases were in children under one year of age, one of these being 6 days and another 7 days old. Of the apparently uncomplicated cases it is not clear from the article how many developed in the hospital under the same epidemic influences as the majority, but that some did is expressly stated.

It seems to us, therefore, clear that the cases examined by Dr. Prudden, taken as a series, should not be regarded as cases of primary diphtheria, but rather as diphtheria secondary to scarlatina, measles, erysipelas, or as developing in a situation where these diseases prevailed. While we do not possess all of the information desirable as to the etiology of the pseudo-membranous anginas secondary to various infectious diseases, and while we know that some of these are etiologically identical with primary diphtheria, it is certain that many of these cases should be separated from primary diphtheria. It has been shown by Wurtz and Bourges,[1] as well as by others, that the pseudo-membranous angina, occurring in the early stages of scarlatina, is accompanied regularly by a streptococcus probably identical with that found by Prudden, and not by the Klebs-Löffler bacillus. While it seems remarkable that in not a single instance, even of the apparently primary cases of diphtheria, did Prudden find the Löffler bacillus, we consider, for the reasons stated, that his observations need not be interpreted as contradictory to the conclusions of others who have studied cases of primary diphtheria. Nevertheless, it is evidently desirable that further bacteriological examination of cases of diphtheria occurring in this country should be made—the more so in view of the statements of Löffler already quoted.

In May, 1890, we therefore began the bacteriological examination of the membranous exudations in cases of diphtheria occurring in Baltimore. At the time of our examinations diphtheria was not prevailing as an epidemic, and we were unable to secure a large number of cases. In consequence, however, of the uniformity of the results obtained, and of their correspondence with those of European investigators in hundreds of cases, it did not seem necessary to examine a very large number in order to establish the etiological identity of our diphtheria with that in other countries. We have, however, waited before publishing our results in order to obtain more cases, but as we have not been fortunate in this respect, we have decided not to wait longer for additional cases.

In all of the cases of diphtheria examined by us the clinical diagnosis was positive, and all were primary diphtheria developing in healthy children. All of the cases were in private practice and occurred in different parts of the city. For the opportunity of examining the cases we are indebted to Drs. Jay, Cordell, Lockwood, Booker, McCormick and Neff. The examinations were all made with bits of membrane removed during life. At first we removed these bits from the tonsils, or soft palate or pharynx, by means of sterilized forceps, but we afterward found it sufficient, as a rule, to touch or scrape or slightly bore into diphtheritic exudations in these situations with a sterilized platinum wire loop which had been flattened. Small particles of diphtheritic membrane, thus removed, were transferred to a sterilized test-tube, and carried to the laboratory where they were at once examined.

In each case cover-glass preparations were made from the membranous particles, and then, usually after washing in sterilized salt solution, a series of smear cultures was made in five or six tubes of slanting glycerine agar, or of Löffler's blood-serum and bouillon mixture, and a series of three or four plate cultures with glycerine agar (Petri's dishes being used) was prepared. When the material sufficed we likewise often made similar cultures in nutrient gelatine or plain nutrient agar. Only in the last two cases which we examined did we make use of the blood-serum and sugar bouillon mixture recommended by Löffler, upon which we found the diphtheritic bacillus to grow much more rapidly and luxuriantly than upon any of the other media used, but as at first we did not have this medium prepared, and as we nevertheless had no difficulty in obtaining positive results with the other media, particularly the glycerine agar, we continued to use the latter in most of our work. There are, however, distinct advantages in the use of the blood-serum bouillon medium, upon which the colonies of the Klebs-Löffler bacillus at a temperature of 35° C. are readily recognized in 18 to 24 hours. The study of the colonies we found a decided help in the isolation of the diphtheritic bacillus, and their characteristic features are well marked in glycerine-agar plate cultures, which, therefore, may be recommended as a most useful medium for isolating the organism. After separating the bacillus in pure culture, its virulence was tested in each case by inoculation of guinea-pigs. We had for comparison a pure culture of the Löffler bacillus, obtained from the Hygienic Institute in Berlin, for which we are indebted to Dr. von Esmarch. The identification of the bacillus, in our cases, was based therefore upon the study of its morphology, its behavior in various culture media, and its effects when inoculated into guinea-pigs and other animals. In all respects we found it identical with the Löffler bacillus in the culture obtained from Berlin.

The following is a brief summary of the cases examined:

Case 1.—Negro girl, 7 years old, has been sick two days. A thick whitish membrane covers tonsils, pharynx and anterior surface of uvula and soft palate. The child recovered. A piece of membrane 2 mm. thick and 5 mm. long was removed with forceps. Microscopical examination showed the usual structure of a diphtheritic membrane. Cover-glass preparations showed, singly and in clumps, bacilli averaging about the length of tubercle bacilli but thicker, often with one, sometimes with both ends swollen, frequently in one or both ends a small round body staining more deeply with methylene blue than the rest of the bacillus. These bacilli sometimes appeared slightly curved or broken into irregular segments. In addition, in considerable number, were found cocci single, in pairs and occasionally in chains, and a few long, slender bacilli were present.

Glycerine agar plate cultures showed in No. 1 diffuse cloudiness from abundant growth, in No. 2 very numerous scattered small

[1] Wurtz and Bourges, *Archives de Médecine Expérimentale*, T. II, p. 341, 1890.

colonies, and in Nos. 3 and 4 well distributed colonies. With the exception of 4 large white colonies of a coarse coccus in No. 1, only colonies of a streptococcus and of the Löffler bacillus were recognized, these two being in about equal number. The surface colonies of the Löffler bacillus were readily recognized in cultures two or three days old by their whitish centre, grayish translucent periphery, thin, dry appearance, and, under the microscope, the light brownish centre, the coarsely granular periphery (the granules appearing rather more as short lines than as granules) and slightly wavy or irregular contours.

A guinea-pig inoculated subcutaneously with 0.7 cc. of a suspension in sterilized NaCl solution from a pure culture of the diphtheritic bacillus from this case, died in 60–70 hours with extensive local œdema, slight swelling of spleen, irregularly mottled kidneys, swollen and reddened supra-renal capsules, and moderate increase of pericardial and pleural fluids. The diphtheritic bacilli were obtained in pure culture from the œdematous fluid, but tubes inoculated from the lymph-glands, blood, spleen, liver and kidney remained sterile.

As the results and methods in subsequent cases are similar, they can be described more briefly.

CASE 2.—Negro woman, 18 years old, living in a family in which one child had recently died of diphtheria and four others are at present either sick or recovering from the disease, is said to have been sick about ten days, has a thick, rather tough, coherent, whitish membrane on uvula and soft palate. Patient died.

Cover-glass specimens showed, with the exception of very few streptococci and still fewer large cocci in clumps, only the Löffler bacillus, and this in large number, so that the specimens look almost like pure cultures.

Glycerine agar plates showed only in No. 1 very few streptococcus colonies, and large white colonies of a coarse coccus. The rest were colonies of the diphtheritic bacillus which appeared in pure culture in the numerous colonies of No. 2 and the scattered colonies of No. 3. Guinea-pig died with characteristic lesions in 48 hours.

CASE 3.—Mulatto boy, 4 years old. Three children in same family had been attacked with diphtheria and one had died. Grayish-white membrane on both tonsils and pharynx. Patient died.

Cover-glass specimens showed the Löffler bacillus as the predominant organism in large number. No streptococci found.

Cultures in glycerine agar were almost pure of the diphtheritic bacillus, the colonies being very abundant. No streptococcus colonies could be found. Guinea-pig died in 36 hours with characteristic lesions.

CASE 4.—Mulatto girl, 3 years old. Tonsils and posterior wall of pharynx covered with yellowish-gray diphtheritic membrane. Patient recovered.

Cover-glass preparations showed a large number of Löffler bacilli, mostly with swollen ends, sometimes of fusiform shape, also many short oval or slightly pointed bacilli and a few cocci, but none were found in chains.

Cultures in glycerine-agar presented, in about equal number, colonies of the Löffler bacillus and of a short oval bacillus. A few colonies of a coccus, occurring in short chains of five or six cocci, were found. Guinea-pig died with the characteristic lesions in 50 to 60 hours.

CASE 5.—Mulatto girl, 7 years old, in same family as preceding case. Firmly adherent tenacious gray membrane on left tonsil. Patient recovered.

Cover-glass specimen showed a large number of characteristic Löffler bacilli with their so-called involution forms, also many short oval bacilli, sometimes in clumps, a few coarse long bacilli, and a few large cocci. No streptococci.

The cultures and inoculation of guinea-pig gave the same results as in the preceding case.

CASE 6.—Mulatto boy, 6 years old, in same family as case 3. Thin gray adherent membrane covered both tonsils and was present also on pharynx. Patient died.

Cover-glass preparations showed as the predominant organism the Löffler bacillus in the form often of slightly curved club-shaped bacilli, frequently in clumps. In addition, short oval bacilli and cocci were present in considerable number.

The glycerine-agar plate cultures showed a large number of colonies of the Löffler bacillus, and a nearly equal number of colonies of the staphylococcus pyogenes aureus. A few streptococcus colonies were found and a large number of colonies of a short oval bacillus, occurring frequently in long chains. A guinea-pig died in 36 to 48 hours with the usual lesions.

CASE 7.—Girl, 7 years old. Sick for 3 days. Both tonsils covered with grayish-yellow diphtheritic membrane. Patient recovered.

Cover glass preparations showed Löffler bacilli, but not in so large number as various other organisms of different shapes including long thin rods and threads, short oval bacilli, large cocci, sarcinæ, etc.

Glycerine-agar and blood-serum cultures showed a moderate number of characteristic colonies, on the latter medium impure, of Löffler's bacilli and a larger number of colonies of various kinds of bacteria, chiefly streptococci, short oval bacilli and yeast fungi. A guinea-pig died in about 72 hours with characteristic lesions.

CASE 8.—Boy, 3 years old. Has been sick 4 days with fever and symptoms of croup. Examination of throat difficult on account of struggles of patient, but certainly no pseudo-membrane is visible on the tonsils or pharynx, but the attending physician thinks that he has detected it in the larynx. The breathing of the child indicates laryngeal obstruction and the cough is croupal in character. Notwithstanding repeated observations no false membrane could be detected at any time in pharynx or on tonsils or soft palate. Some muco-pus was scraped from the back of the pharynx and used for cultures. Patient recovered, improvement beginning in 5 days after onset of symptoms.

Blood-serum cultures showed a few large white colonies of a coarse coccus and a very large number of colonies of the Löffler bacillus, the latter representing almost a pure culture. A guinea-pig died after inoculation on the third day with characteristic lesions.

The preceding eight cases are all of the cases of diphtheria which we have had an opportunity of examining by culture methods. All were cases of primary diphtheria in which, with the possible exception of case 8, no doubt existed as to the clinical diagnosis of diphtheria. In case 8, the membranous deposit was limited to the larynx and trachea, the case being therefore one of primary

laryngo-tracheal diphtheria, or so-called membranous croup, but in this case we obtained a nearly pure culture of the Löffler bacillus from the pharynx. The cases developed in patients living in widely separate parts of the city. In every case we found the Löffler bacillus and in most cases both on cover-slip preparations and in cultures this organism was the predominant one present, existing in the bits of membrane examined sometimes in nearly pure culture.

We have also made bacteriological examinations in a considerable number of cases which have served as a control for the cases of diphtheria. A few of these control cases have been children without any affection of the throat, most of them have been cases of simple inflammation of the tonsils or pharynx in which no suspicion of diphtheria existed, four have been cases of somewhat suspicious whitish exudation upon the tonsils, so-called follicular tonsillitis, in which at first the possibility of the existence of diphtheria has been entertained by the attending physician, but the subsequent history of the case has shown that it was not diphtheria. In one case we have made a bacteriological examination of the pharyngeal secretion three weeks after the diphtheritic membrane had disappeared. In none of these cases have we found the Löffler bacillus, nor any bacillus which an experienced bacteriologist would be likely to confound with the Löffler bacillus. We have not met with the so-called pseudo-diphtheritic bacillus, but in view of the limited number and special character of the cases which we have studied, we are not prepared to draw any conclusions as to the prevalence of the latter species.

The results of the bacteriological examination in the cases where at first there was some suspicion of diphtheria which the subsequent course showed to be unfounded, have convinced us as to the great practical value for diagnostic purposes of a bacteriological examination by cover glass specimens and by cultures in this large group of cases often so puzzling to the practitioner.

The following case is an illustration.

A boy 8 years old was brought to the dispensary of the Johns Hopkins Hospital. Nearly the whole of the right tonsil was covered with a soft yellowish-white membranous mass which could be easily removed with the forceps. The boy had fever but did not appear very sick. Cover-slip preparations showed a variety of micro-organisms, the most conspicuous ones being cocci both in groups and in chains, rather short thick rods, and spirochaete. The cultures showed as the predominant organism colonies of streptococci and of staphylococcus pyogenes aureus. Notwithstanding extended search not a single colony of the Löffler bacillus was found. In three days the inflammation had disappeared and the boy was well. None of several children living in the same apartments developed any soreness of the throat. We have examined with similar results three other analogous cases.

We have had the opportunity of examining microscopically two large pieces of diphtheritic membrane which had been expelled by patients living at a distance and which hardened in alcohol were sent to the laboratory. Sections of these membranes after staining by Gram's method showed in clumps and singly the characteristic Löffler bacilli which could be readily identified by their peculiar shapes and staining.

The only species of bacteria which we have found constantly in the cases of diphtheria has been the Löffler bacillus. Two other species have been present in many cases, viz: the well-known streptococcus, which grows in much smaller colonies and less rapidly than the Löffler bacillus and a short oval, often slightly pointed bacillus, growing in long chains running parallel to each other. There are often marked irregularities in shape and especially in size of this baciilus, even of individuals in the same chain. The colonies of this organism are grayish-white, moist, larger than those of the streptococcus but smaller than those of the Löffler bacillus. The colonies of this short bacterium bear more resemblance to those of the Löffler bacillus than any others which we have met with, although colonies of other organisms bear a greater similarity in rapidity of growth and in size, notably those of a large coccus, but they are readily distinguished by a more opaque white appearance.

We have not utilized any of the material from the cases of diphtheria which we examined by culture methods, in order to study the distribution of the bacteria in the membranes, as the material rarely sufficed for hardening and making sections. We have, however, studied sections prepared by Dr. Councilman from a large number of cases of diphtheria. These were of cases of diphtheria dying in Frankfurt, Germany, the sections being made under Prof. Weigert's direction, and stained by his new modification of the fibrin stain, the details of which have not yet been published. Upon these sections both the fibrin and the Löffler bacilli are brilliantly stained, and the diphtheritic foci described by Oertel in the mucous membrane and in lymphatic glands and elsewhere are well shown. The Löffler bacilli, with their irregular, often bent, shapes, segmented appearances and deeply stained granules, are clearly to be seen. The usual arrangement is as follows: Most superficially is a deeply stained mass containing various kinds of bacteria, among which the Löffler bacilli are to be recognized; beneath this comes a feebly stained layer, rich in cells, but containing little or no fibrin; in this layer the Löffler bacilli, both singly and in clumps, are much more readily made out. In the deeper parts of this pale layer, the Löffler bacilli are often the only bacteria present, and especially just above the deeply stained fibrin layer, characteristic clumps of these bacilli are present. Streptococci may, however, also be present in this layer. The layer resting upon the mucous membrane is rich in fibrin and therefore stains deeply with the Weigert stain. In this fibrin layer, except in its most superficial parts, no Löffler bacilli are to be seen. This arrangement of the bacilli corresponds with the description given by Klebs and by Löffler. We have never found the bacilli in the mucous membrane affected nor in sections from internal organs, not even in the diphtheritic foci presenting nuclear fragmentation and hyaline masses and fibrin. The Löffler bacilli, therefore, not only do not invade the affected mucous membrane; they do not usually even extend throughout the entire thickness of the diphtheritic pseudo-membrane. On the other hand, various complications of diphtheria may be due to the secondary invasion of other organisms, notably streptococci, which are occasionally found in the mucous membrane, lymphatic glands and elsewhere.

Our studies of the morphological and biological properties of the Klebs-Löffler bacillus are, in the main, simply confirmatory of the results of other investigators, and we shall therefore give only a brief description of this part of our work, emphasizing only certain points which are not clearly brought out in the publications of previous observers.

The bacillus is non-motile. It varies greatly in size and shape, averaging 2.5 to 3 μ in length and 0.5 to 0.8 μ in thickness. Its morphological characters are so peculiar as to render its identification on cover-slip preparations and on sections from diphtheritic membranes in most cases an easy matter. Sometimes, appearing

as a regular straight or slightly bent rod, with rounded ends, it is especially characteristic to find irregular and often bizarre forms, such as rods with one or both ends swollen, and very frequently rods broken at irregular intervals into short sharply-marked segments, either round, oval or with straight sides. Some forms stain uniformly, others in various irregular ways, the most common being the appearance of deeply stained granules in a lightly stained bacillus.

Most writers are silent upon the question as to whether the Löffler bacillus stains by Gram's method or not. It is stated by Beck[1] that in sections it cannot be stained either by Gram's or by Weigert's fibrin method. This is contrary to our experience. We find that both in sections and in cover-glass specimens from blood-serum cultures, the bacilli stain well by Gram's method. Only by prolonged decolorization of cover-glass preparations with alcohol and oil of cloves do most of the bacilli lose their color. We find both Gram's and Weigert's fibrin method admirably adapted for the staining of sections of diphtheritic membranes in order to demonstrate the Löffler bacilli. Nothing can surpass in brilliancy and sharp differentiation, sections stained doubly by the modified Weigert's fibrin stain and picro-carmine.

The Löffler bacillus can be cultivated readily upon all of the ordinary culture media, viz.: alkaline bouillon, nutrient gelatine, nutrient agar, glycerine agar, blood-serum and potato. The medium upon which it grows most rapidly and luxuriantly, and which is best adapted for determining its presence in diphtheritic exudations, is the mixture of blood-serum and bouillon as recommended by Löffler (three parts blood-serum and one part bouillon, containing 1 per cent. peptone, 1 per cent. grape sugar and 0.5 per cent. chloride of sodium; the mixture, of course, to be solidified in the usual way for blood-serum). For blood-serum can be substituted serous transudations, but these have not seemed to us quite equal to the blood-serum. On the blood-serum mixture the colonies of the Löffler bacillus grow so much more rapidly than other organisms usually present in the secretions and exudations in the throat that at the end of twenty-four hours they are often the only colonies which attract attention, and if other colonies of similar size are present they are generally of quite different aspect. A blood-serum tube, studded over with coalescent or scattered colonies of the Löffler bacillus, is so characteristic in appearance that one can anticipate with tolerable certainty the result of the microscopical examination. By this method of cultivation a diagnosis can usually be made on the day following the inoculation of the tube. The colonies are large, round, elevated, grayish-white, with a centre more opaque than the slightly irregular periphery. The surface of the colony is at first moist, but after a day or two rather dry in appearance.

The appearances of the young colonies in glycerine agar and plain nutrient agar are well depicted by Flügge.[2] We have found the bacillus to grow well in agar, as a rule, but often the first inoculations of a plain nutrient agar tube have given comparatively feeble growths while subsequent inoculations have afforded more abundant growths. Nutrient gelatine, of a feebly alkaline reaction, we have found an excellent medium at a temperature of 22° C., and we have repeatedly obtained pure colonies of the Löffler bacillus on this medium from diphtheritic deposits. Like Fränkel and Brieger,[3] we have sometimes observed a diffusely cloudy growth of the Löffler bacillus in alkaline bouillon, but, as a rule, the growth has been, as Löffler described it, in the form of small whitish specks at the bottom and along the sides of the tube, leaving the fluid clear. In bouillon cultures, standing a long time in the thermostat at 35° C., sometimes a soft whitish membrane forms over a part of the surface.[4] The reaction becomes at first acid and subsequently again alkaline, changes which can be well observed in cultivations in bouillon to which a little rosolic acid has been added.

Löffler and following him most writers state that the diphtheritic bacillus does not grow on potato unless it is rendered alkaline. Zarniko,[5] however, says that after 8 to 10 days, at a temperature of 35° C., a growth of extremely distorted rods can be recognized as a delicate whitish deposit where the potato has lost its glistening appearance. Our experience has been that the bacillus diphtheriæ grows on ordinary steamed potato without any preliminary treatment, but that the growth is usually entirely invisible or is indicated by a dry thin glaze after several days. Doubtless the invisible character of the growth has led most observers into the error of supposing that no growth existed, whereas the microscopical examination reveals a tolerably abundant growth, which on the first potato is often feebler than on succeeding ones. Irregular forms are particularly numerous in potato cultures, and in general the rods are thicker than on other media. In 24 hours, at a temperature of 35° C., microscopical examination shows distinct growth. We have cultivated the bacillus for many generations on potato.

We have tested the thermal death point upon bouillon cultures and suspensions in sterilized salt solution in capillary glass tubes and have found that the bacillus is killed at a temperature of 58° C. in ten minutes. It does not form spores.

We have used guinea-pigs, rabbits and kittens for inoculation experiments with pure cultures.

Most of our inoculations have been made upon guinea-pigs by subcutaneous injections of 0.1 to 0.7 cc. bouillon cultures or dilute suspensions in sterilized salt solution of the Löffler bacillus or by inserting a platinum needle carrying a small quantity of the culture. The duration of life in these animals has varied from 24 hours to four to five days. The usual changes have been an extensive local oedema with more or less hyperaemia and ecchymosis at the site of inoculation, frequently swollen and reddened lymphatic glands, increased serous fluid in the peritoneum, pleura and pericardium, enlarged and hemorrhagic supra-renal capsules, occasionally slightly swollen spleen, sometimes fatty degenerations in the liver, kidney and myocardium. There are variations as to the extent and presence of these lesions in different cases which need not be here described. We have always found the Löffler bacilli at the seat of inoculation, most abundant in a grayish-white fibrino-purulent exudate present at the point of inoculation and becoming fewer at a distance from this, so that the more remote parts of the oedematous fluid do not contain any bacilli. We find the bacilli not only free but contained in large number in leucocytes, some of which have fragmented nuclei or have lost their nuclei. The bacilli within the leucocytes as well as some outside sometimes stain very faintly and irregularly and may appear disintegrated and dead. We have never failed to obtain the bacilli in cultures from the point of inoculation and think it likely that the negative results of some observers in

1 Beck, *Zeitschrift für Hygiene*, Bd. VIII, p, 436.
2 Flügge, *Die Mikroorganismen*, p. 229. Leipzig, 1886.
3 Fränkel and Brieger, *Berliner klin. Wochenschrift*, 1890, p. 243.
4 Noticed also by Roux and Yersin, *Annales de l'Institut Pasteur*, 1889, p. 274.
5 Zarniko, *Centralblatt f. Bakteriologie*, Bd. VI, p. 180.

demonstrating the bacilli are due to making their examinations with the oedematous fluid at a place too remote from the point of inoculation. In all cases culture tubes inoculated with the blood, spleen, liver, kidney, supra-renal capsules, lymphatic glands and serous transudates, have yielded negative results.

Rabbits are less susceptible, but they have usually died in the course of 5 to 20 days after inoculation of even small quantities. They develop as a rule paralysis affecting the posterior extremities, and we have also observed a peculiar tremulous motion and irregular respiration.

An affection may be reproduced by inoculation of certain animals in all respect identical with the disease diphtheria as it exists in man. The following case selected from several similar ones is an example.

A half grown kitten is inoculated into the trachea with one platinum loop from a pure culture of the Löffler bacillus on glycerine-agar, 11 days old, derived from Case 4. For the inoculation a small median incision was made over the trachea in which a hole just large enough to admit the platinum loop was made. The culture was rubbed over the mucosa of the trachea for an extent about 3 ctm. in length, and in this process sufficient force was used to abrade the mucous membrane. On the day following the inoculation no special alteration in the animal was observed, but on the morning of the second day it was found very weak. In the course of this day it became so weak as to lie completely motionless, apparently unconscious with very feeble shallow respiration. Several times it was thought to be dead but on careful examination proved still to be breathing feebly. It was found dead on the morning of the 3rd day. At the autopsy the wound was found gaping and covered with a grayish, adherent, necrotic, distinctly diphtheritic layer. For a considerable distance around the wound the subcutaneous tissues were very oedematous, the oedema extending from the lower jaw down over the sternum and to the sides of the neck and along the anterior extremities. The lymphatic glands at the angle of the jaw were markedly swollen and reddened. The mucous membrane of the trachea beginning at the larynx and extending down for 6 ctm. was covered with a tolerably firm, grayish white, loosely attached pseudo-membrane in all respects identical with the croupous membranes observed in the same situation in cases of human diphtheria. No other noticeable lesion was found in the animal unless it be a greater degree of fatty metamorphosis of the renal epithelium than is normal in kittens. Both in the pseudo-membrane and in the oedematous fluid adjacent to the wound many bacilli diphtheriæ, occurring often in clumps, were recognized on cover-slip preparations and this species grew in a large number of colonies on plate cultures. It is interesting to note that the faithful attendants of the Löffler bacillus, streptococci, were present also in the same situations.

The mere production of a pseudo-membranous inflammation can not be claimed as establishing by itself alone the etiological role of the bacillus diphtheriae as such an inflammation as is well known can be produced experimentally in a variety of ways. Greater significance attaches to the demonstration of certain peculiar alterations no less characteristic of the specific action of the diphtheritic virus. As in human diphtheria so in all susceptible animals inoculated with the Löffler bacillus, there is only a local development of the bacilli at the point of infection, and it has been demonstrated especially by Roux and Yersin, and by Brieger and Fränkel[1] that extraordinarily poisonous products formed by the bacilli are absorbed from the site of local development of the bacilli and give rise to the constitutional symptoms and the lesions of internal organs. The separation of these products in a condition approaching purity in the form of one or more toxic albuminous substances and the production by injecting them of paralyses and of other symptoms and lesions (save the pseudo-membrane) of diphtheria are unquestionably brilliant achievements, and have added greatly to the chain of proof leading to the recognition of the Löffler bacillus as the specific cause of diphtheria. Our studies so far as they have been directed to this part of the subject are confirmatory of the results reported by Roux and Yersin and by Brieger and Fränkel.

We have directed our attention with especial interest to the question as to whether the interesting and important discoveries of Oertel,[2] relating to the special action of the diphtheritic virus upon cells and the appearance of peculiar foci of nuclear fragmentation and cell-death with other changes in the lymphatic glands, and the spleen could be confirmed by experiments upon animals. Babes[3] has also communicated some observations upon this point. Dr. Flexner is at present engaged in the Pathological Laboratory in the examination of this question, and the results will be reported subsequently. Here we will only mention that, in a number of instances, we have been able to show not only extensive cell-death characterized by an extreme degree of fragmentation of nuclei at the site of inoculation, but also similar changes in the spleen, lymphatic glands and elsewhere. These peculiar alterations, as Oertel has shown, in their distribution, are characteristic of human diphtheria, and the demonstration of similar changes in animals, inoculated with the Löffler bacillus, is no small additional proof that diphtheria is caused by this micro-organism.

It would seem, therefore, that every postulate necessary to prove that the specific cause of primary diphtheria is the Klebs-Löffler bacillus has been fulfilled, and that this bacillus may be designated the bacillus diphtheriæ. This bacillus is present in every case of primary diphtheria, in such number and situation as to explain the local manifestations of the disease, it can be readily isolated in pure culture, and a disease identical in all respects with human diphtheria can be produced experimentally by the inoculation of pure cultures. The investigation of the toxic albumens, produced by this remarkable bacillus, has cleared up many obscure points.

The only points which can be brought forward as tending to cast any doubt upon the recognition of this bacillus, as the specific cause of diphtheria, are the very exceptional observation of an apparently identical bacillus in the throat of healthy children and the more frequent observation of a bacillus, usually called the pseudo-diphtheritic bacillus, which differs from the true bacillus diphtheriæ chiefly or only by the absence of pathogenic properties when inoculated into animals.

The finding in healthy individuals of a bacillus apparently identical with the bacillus diphtheriæ is such a rare occurrence that Löffler, who made the first observation of this nature, has not been able to repeat it during several years of search. When found it has been present in such small number as to present a marked contrast to the results in cases of diphtheria. The exceptional occurrence in healthy persons of the

1 Roux and Yersin, *Annales de l'Institut Pasteur*, 1888, 1889, 1890. Brieger and Fränkel, *Berliner Klinische Wochenschrift*, 1890.

2 Oertel, *Die Pathogenese der epidemischen Diptherie nach ihrer histologischen Begründung*, Leipzig, 1888.

3 Babes, *Centralblatt f. Bakteriologie*, Bd. VIII, p. 741.

bacillus diphtheriæ in such small number as to indicate that it does not find suitable conditions for its multiplication and injurious action upon the tissues, seems to us in no way opposed to the acceptance of this bacillus as the specific cause of diphtheria. Experiments upon susceptible animals show that to produce in them a pseudo-membranous inflammation of a mucous membrane by inoculation with the diphtheritic bacillus, it does not suffice simply to apply the bacilli to the surface of the mucous membrane but that an actual injury must be done to the membrane. While it is by no means proven that an injury to or a morbid condition of the mucous membrane is necessary for the infection of human beings with the diphtheritic virus, nevertheless such conditions are recognized as important predisposing causes, and clinical observations point to differences in susceptibility to infection with this virus, so that there is no reason why in some healthy persons the bacillus diphtheriæ might not be present in the mouth without doing any damage.

The status of the so-called pseudo-diphtheritic bacillus can not be considered as settled. Whereas Löffler finds such morphological and biological differences between it and the true bacillus diphtheriæ as to lead him to regard it as unquestionably a different species, Roux and Yersin consider that it is simply a modification of the bacillus diphtheriæ, from which it differs only by absence of virulence. They claim that the pseudo-diphtheritic bacillus is identical in its morphology and its behavior on culture media with the diphtheritic bacillus, and, calling attention to the marked variations in virulence of the diphtheritic bacilli found not only in different cases but in the same case of diphtheria, they assert that every transition exists between the most virulent diphtheritic bacillus and the non-virulent pseudo-diphtheritic bacillus. Although their observations and experiments have not proven their belief, they bring forward strong arguments in support of the view that the bacillus diphtheriæ under certain circumstances may be converted into a non-virulent variety and conversely the non-virulent bacillus into the virulent form. The pseudo-diphtheritic bacillus appears to be not particularly uncommon in the mouth and throat of healthy children or of children not affected with diphtheria, but when present it does not occur in anything approaching the number of diphtheritic bacilli ordinarily found in cases of diphtheria, so that a diagnostic error is not likely to result even in cases in which it exists. The inoculation of animals will settle the question. Whatever may prove to be the nature of the pseudo-diphtheritic bacillus, it does not seem to us that the observation of a non-virulent bacillus resembling or even identical morphologically and in modes of growth on culture media with the bacillus diphtheriæ can be justly urged as an argument opposed to the recognition of the latter organism as the specific cause of diphtheria, and indeed certain facts in the development of diphtheria may possibly find their best explanation in the assumption that the bacillus diphtheriæ may exist in a non-virulent state, and under certain conditions which we do not now understand may acquire virulence.

There are few infectious diseases upon which greater light has been shed by the discovery and study of their specific microorganisms than has been the case with diphtheria.

We are now in possession of a positive means of diagnosis, and while it may be questioned whether practitioners of medicine in general are likely to be in a position to make use of this means, the method is not difficult and can be readily applied. We have already learned that there are pseudo-membranous anginas which must be separated etiologically from true diphtheria, and also that diphtheria may exist in extremely mild forms even without visible pseudo-membranous deposits. We are now in a position to clear up a hitherto confusing and much disputed chapter in etiology. The endless controversy as to whether diphtheria is primarily a local or a general disease is settled in favor of the doctrine that it is primarily local, and that the grave constitutional symptoms are the result of intoxication with poisonous products, formed by the local action of the bacilli. We are able to study experimentally the various effects resulting from the action upon the animal body of the specific toxic products of the diphtheritic germ. We can separate the alterations belonging to the disease itself from the many complications of the disease. Intelligent measures of prophylaxis can be based upon a definite knowledge of the characters of the specific germ and its behavior in the body, and such measures have already been formulated. Rational indications for treatment can be established.

That the blood-serum of animals rendered artificially immune against the diphtheritic bacillus and its products is capable of destroying or nullifying the effects of the toxic albumens of diphtheria, although not of killing the bacilli, is a new conception in medicine, and this, together with other observations of Fränkel and of Behring upon the production of immunity, opens up new vistas which may lead to results of the greatest scientific and practical importance.

INSTRUCTION IN HYGIENE.

A course of instruction in practical Hygiene, under the charge of Dr. John S. Billings, Surgeon U. S. Army and Lecturer on Hygiene in the Johns Hopkins University, and Dr. A. C. Abbott, Assistant in Bacteriology and Hygiene in the Johns Hopkins Hospital, will be given in this institution during the months of March, April, and May, 1891.

The course will begin Monday, March 2nd, and will continue for four days in each week, (Monday, Tuesday, Thursday and Friday) from 9 until 12 o'clock a. m., until Friday, May 29th. One hour each day will be given to demonstrating the methods to be employed in the day's work, the remaining two hours will be for the practice of the methods by the students.

The instruction will comprise Lectures and practical work in the Laboratory.

I. Lectures. A course of four lectures on practical subjects will be given during April, by Dr. Billings. The subjects and dates of these lectures will be announced later.

II. The practical work in the Laboratory will comprise the following:

(1) Investigations upon the Atmosphere, { Physical, (Meteorological), / Chemical, / Bacteriological.

(2) Investigation of the Water, { Chemical, / Bacteriological.

(3) Investigation of Ground, { Physical, / Chemical, / Bacteriological.

(4) Inspection of Milk.
(5) Inspection of Meat.
(6) Studies upon Heating and Ventilation.
(7) Practical work in the methods of Disinfection and Sterilization, both chemical and thermal.
(8) Examination of the Ground for Building Sites.
(9) Inspection of Building Materials.
(10) Examination of Clothing Materials.

The practical work will be carried on in the Hygiene Laboratory which has been fitted up for the purpose.

The fee for the course will be $50.

Only those students who give evidence of fitness to profit by the course will be received. The right is reserved to ask the withdrawal of any student who, for any reason, is not making a success of the work.

Applications for admission to the course should be addressed to the

SUPERINTENDENT OF THE JOHNS HOPKINS HOSPITAL,
NORTH BROADWAY, BALTIMORE, MD.

CIRRHOSIS HEPATIS ANTHRACOTICA.

By Professor WILLIAM H. WELCH, M. D.

(A PAPER READ BEFORE THE JOHNS HOPKINS HOSPITAL MEDICAL SOCIETY, ON DECEMBER 15TH, 1890).

I have placed under the microscopes sections of a liver showing a peculiar form of cirrhosis associated with the deposition of coal pigment. The specimen of liver together with portions of other organs were sent to me recently by Dr. Unger, of Mercersburg, Pa., for microscopical diagnosis. All that I have been able to learn of the history of the man from whom the specimens were obtained is as follows. He was a German, about 70 years of age, who had lived for many years as a farmer in the neighborhood of Mercersburg, Pa. He is said to have worked as a weaver in Germany, but nothing more definite concerning his occupation or life in that country could be learned. The place where he lived in Pennsylvania is not particularly smoky. His health was good until about two years ago when he began to suffer from vomiting, loss of appetite and severe pain in the abdomen. Accumulation of fluid in the peritoneal cavity necessitated repeated tappings by which serous fluid was withdrawn. The patient grew very weak and emaciated.

The autopsy was made by Dr. Unger, and on account of special external circumstances was necessarily hasty and incomplete. Only the abdominal organs were examined and Dr. Unger as regards these, was chiefly interested in the character of the new growth which was found. The peritoneum was found much thickened and presented many nodular masses, mostly of small size. The omentum was thickened and retracted into a hard, nodulated, cord-like mass. The mesentery was likewise thickened and retracted. A number of small, hard, whitish, circumscribed nodules were found in the superficial part of the liver. Pieces of the liver, omentum and peritoneum were sent to me for examination. Sections of the nodular tumors showed them to be carcinomata, presenting a fibrous stroma rich in cells and irregular alveoli filled with polyhedrical and cuboidal cells. The primary origin of the cancer was not determined, although doubtless a more complete autopsy would have revealed it.

The most interesting feature of the case, however, is the condition of the liver. Of this organ several pieces hardened in alcohol were sent. On the cut surface as well as through the capsule of the liver can be seen with the naked eye numerous small black specks and small streaks. These little black lines and dots are present everywhere throughout the liver scattered irregularly at intervals not more than 0.5 to 1 mm. apart. They are irregular in size and shape. They are not present in the cancerous nodules nor more abundant in their neighborhood than elsewhere. Some of the pieces of liver which were sent do not contain any cancerous nodules. Around many of the black specks the tissue has a grayish color. The prevailing color of the liver substance between the black deposit is yellowish brown.

On microscopical sections the little black spots and streaks, sometimes lying in a grayish tissue, sometimes in the yellowish brown liver substance, can be seen distinctly with the naked eye. By microscopical examination the black foci are seen to be due to the deposit of black granules in all respects identical with the coal pigment found in the lungs. The granules are of a pure black color, vary in size from granules about one quarter the diameter of a red blood corpuscle to very minute granules, occur sometimes in large conglomerate masses evidently composed of a close aggregation of granules, and are sometimes quite regularly round, but may be slightly irregular and angular in shape. They occur both free and enclosed in cells. They remain unchanged when the sections are treated with concentrated sulphuric acid as well as with boiling glacial acetic acid, hydrochloric acid, nitric acid, aqua ammoniae or concentrated liquor potassae. Compared with the coal pigment found so often in the lungs and bronchial glands absolutely no points of difference can be detected and I have therefore no hesitation in saying that they are coal particles.

The particles of coal pigment are not distributed uniformly throughout the liver as is the case with malarial pigment but occur in scattered areas. There are in some places small deposits of the pigment between unchanged liver cells. These deposits between liver cells are generally within round or irregular cells lying against the capillary walls and sometimes appear to be contained in Kupfer's cells. The black pigment is never within the hepatic cells. As a rule the pigment lies within bands and nodules of dense fibrous tissue, and it is the character of these fibrous areas and the relation to them of the coal pigment that make the unusual feature of the case.

These fibrous areas differ in distribution and in appearance from the formation of fibrous tissue in ordinary hepatic cirrhosis. The fibrous areas are sharply circumscribed. They never completely surround a lobule. They occur most frequently in the interlobular tissue, but they are also often formed around the central veins as well as at any point in the interior of a lobule. They vary in size. Some are not larger than a group of five or six liver cells, others occupy nearly the entire field of the microscope with Zeiss objective A, ocular 3. The majority are much smaller than this latter dimension, averaging about one-sixth to one-eighth the diameter of a liver lobule. Five to eight such nodules can usually be seen in each field of the microscope with Zeiss A, ocular 3. The shape of the fibrous patches varies, but there is a general tendency to assume a round or oval shape. Many of the patches, however, are long and narrow following the course of the interlobular vessels or the rows of liver cells. The fibrous areas are in general composed of dense sclerotic fibrous tissue poor in cells, these cells being chiefly elongated connective tissue cells closely applied to the fibres and cells containing black pigment. Some of the areas, especially the smaller intra-lobular ones are composed of a hyaline indistinctly fibrillated material poor in cells. In the interlobular fibroid formations can be seen very much compressed interlobular veins, branches of the hepatic artery with thickened walls resulting from an obliterating endarteritis leading in some instances to complete obliteration of the vessel, and bile ducts. The bile ducts are few and there appear to be no so-called newly formed bile ducts so often observed in ordinary cirrhosis. All of the fibroid formations, whether intra-lobular or interlobular, contain in large amount black coal pigment, both free and in round, oval, and elongated, sometimes branching cells. With the exception of the comparatively few small deposits seen between normal liver cells, the coal deposits are found only in

the fibroid masses and the growths of fibrous tissue do not occur except in association with the pigmentary deposits. There can be seen on careful examination unmistakable evidences that the new growth of fibrous tissue is referable directly to the deposition of coal pigment. Where the pigment is surrounded by normal liver cells, it is present only in comparative small amount. There are places where a clump of the pigment is surrounded by two or three homogeneous liver cells devoid of nuclei or by a little hyaline or finely granular material replacing two or three immediately adjacent liver cells, and places where a small area of nearly homogeneous basement substance containing a mass of coal pigment has taken the place of not more than five or six liver cells in the interior of a lobule and all transitions exist between these small areas and the larger ones. The appearances indicate that small deposits of the coal pigment do not injure the surrounding liver cells, that larger deposits lead to a death of the immediately adjacent liver cells, and as a result of this loss of liver cells, a new growth of dense fibrous tissue is developed.

The histological picture is quite different from that of ordinary hepatic cirrhosis. Instead of interlacing bands of connective tissue more or less completely surrounding lobules or groups of lobules, we have in the present instance sharply circumscribed, round, oval and elongated discrete areas of sclerotic, at times nearly homogeneous, fibrous tissue, containing such masses of coal pigment as to appear in places almost uniformly black. Different as are the appearances from ordinary cirrhosis, there is manifestly a close analogy between the changes in this liver and those occurring in indurative anthracosis of the lungs. In both is found the same formation of circumscribed bands and nodules of dense fibrous tissue, colored black, with coal pigment.

This anthracosis of the liver has no relation to the presence of the secondary cancerous nodules in the liver which are entirely free from pigment.

Besides the changes mentioned there is no other lesion of the liver save a considerable bile pigmentation of the liver cells.

The presence of a small amount of coal pigment in the liver is not particularly uncommon. Instances have been reported by Arnold, Soyka, Weigert and others. We owe to Weigert and to Arnold especially the establishment of the especial conditions leading to this occurence. Whereas under ordinary conditions the bronchial lymphatic glands form an effectual filter against the entrance into the blood of coal pigment inspired into the lung, Weigert has shown that adhesions and destructive inflammations may open the way for the passage of this pigment from the glands directly into adjacent blood vessels, and it is probable that similar alterations in the lungs may lead to the same result. Arnold has pointed out the frequent association of emphysema of the lungs with the presence of coal pigment in the spleen, liver and elsewhere. It is unfortunate that in the present case we have no clue as to the condition of the lungs or of the bronchial glands, but we can hardly be mistaken in assuming that some abnormal condition existed which permitted an unusually free entrance into the circulating blood of coal pigment from these situations. I have repeatedly had the opportunity of confirming the observations both of Weigert and of Arnold, but I have never before seen a liver containing such a large amount of coal pigment as the present one, which is speckled everywhere with black dots and streaks. Ordinarily the presence of coal pigment in the liver is not associated with any important lesions referable to the deposition of the pigment. Careful examination, however, will often reveal atrophied liver cells and a small quantity of dense fibrous tissue poor in cells around coal deposits of considerable size, but so far as I can learn, this is the first instance recorded of a peculiar form of wide-spread cirrhosis of the liver dependent upon the presence of coal pigment, and I propose to designate the condition cirrhosis hepatis anthracotica.

From the description already given, it is clear that the primary change leading to the cirrhosis is the atrophy and death of liver cells. Whether we are to attribute this cell death to a mechanical or to a chemical action of the pigment deposits can not be positively determined, but the former seems the more probable view. Still, as pointed out by Weigert, the coal particles inhaled may carry with them substances of an irritating nature, which may give to the particles an injurious action which the pure carbon granules themselves would not possess. Although occasionally the coal particles were present immediately around and in some places appeared to be within the capillary vessels, there was no such obstruction of the blood vessels by coal pigment as would explain the death of liver cells.

NOTES ON NEW BOOKS.

Principles of Surgery, by N. SENN, M. D., Milwaukee, Wis. (*F. A. Davis, Philadelphia*, 1890).

The experimental and practical worker has not always that grasp of principles, without which a man cannot be called a great surgeon. As an experimental investigator in various departments of surgery, Dr. Senn has had no equal in this country, and this work, just issued, shows in addition a thorough and searching knowledge of the principles of his department. It deals with the subjects of regeneration, inflammation, necrosis, suppuration, and the special surgical affections due to bacterial infection, erysipelas, tetanus, tuberculosis, anthrax and glanders. Thoroughly modern and up to date, accurate and concise, the work will prove a boon both to students and teachers.

Text Book of Materia Medica for Nurses. Compiled by LAVINIA L. DOCK, Graduate of Bellevue Training School for Nurses, etc. (*G. P. Putnam's Sons, New York and London*).

The object of this manual is clearly stated in the preface. It begins and ends with the materia medica and has nothing to do with therapeutics. It treats of the source and composition of drugs; their physiological actions; their favorable or unfavorable results; the symptoms of poisoning with lists of antidotes; and gives practical directions for the administration of drugs. Part 1 relates to the inorganic materia medica which is classified under the headings of alkalis and alkaline earths, metals, non-metallic elements, inorganic acids and the carbon compounds. Part 2 treats of the organic materia medica of the animal and vegetable kingdom. The work is carefully written and clearly and systematically arranged. It is accurate and painstaking and well adapted to the practical use of nurses. The book reflects credit upon its judicious and conscientious compiler.

SYPHILIS OF THE LUNG.

By W. T. Councilman, M. D., *of the Johns Hopkins Hospital.*

[Read before the County Medical Society of Philadelphia, January 13, 1891.]

It would not be within the scope of this paper to give anything but the merest outline of the literature on this subject. Although much has been written on this subject in the preceding century and many cases of *phthisis e lue venerea* reported, the first anatomical description of the disease was given by Depaul, in 1853, in a paper before the Paris Academy, on "A Manifestation of Congenital Syphilis consisting in an Alteration of the Lungs not yet described." Wagner, in his work on *Syphiloma*, gave a much fuller description of the lesions, particularly the congenital form in infants. Virchow expresses himself very guardedly about the disease, and is inclined to be skeptical about most of the cases which have been previously reported. He recognizes certain lesions of the lungs as most probably syphilitic in character, particularly if they are found with other manifestations of syphilis. The most marked of these are a fibrous interstitial pneumonia along the bronchi, leading to the formation of fibrous bands which pass from the centre of the lung toward the periphery along the bronchi and vessels, and which by their contraction produce marked deformity of the lung. Along with this there is frequently a pleurisy leading to the formation of fibrous nodules beneath the pleura. There may also be caseous pneumonia and gummata. He says that cavities may form from the softening of the foci of caseous pneumonia, and then comes the question of syphilitic phthisis. The gummata are with difficulty to be distinguished from other caseous foci in the lungs. The description of Virchow has formed the basis of all subsequent descriptions of the disease, and nowhere is there given a careful description of the finer details of the lesions. Virchow was the first to describe the white pneumonia of children, and Hecker showed its association with syphilis. This condition of the lung described by Virchow was afterward described by Lorain and Robin under the name of epithelioma of the lung, this name being given because the alveoli were closely packed with desquamated fatty epithelial cells. The most of the literature is taken up with accounts of cases, and most of these would now be recognized from the description of the lesions, not as cases of syphilis of the lungs, but as cases of tuberculous phthisis. The idea of a syphilitic phthisis seems to have become deeply rooted in the minds of many clinicians. This idea was largely due to the general acceptance of the views of Virchow as to the non-tubercular character of most of the lesions of phthisis. The most of the cases reported come in the time of the most general acceptance of this belief, from the beginning of 1860 to 1875. Then they become less frequent, and since Koch's publication and the general recognition of tuberculosis as the cause of phthisis, there have been few publications on the subject. The most complete monographs on the disease, with careful reviews of the literature, are by Carlier in 1882 and Hiller in 1884. Carlier collected 75 cases, chiefly from English and French sources, and in 50 of these the report of the autopsy was given. Hiller reports 87 cases, 84 of these with autopsies, and gives a careful *résumé* of the description of the lesions in these cases. Carlier had already reported 20 of the cases of Hiller. Hiller himself reports 2 undoubted cases in which, along with evidences of syphilis, the characteristic lesions were found in the lungs. Hiller denies *in toto* the existence of a syphilitic phthisis, and thinks the cavities in the cases which are to be regarded as syphilitic were bronchiectases, and, from the description of these cavities, it is almost certain he was right. The cases he regards as doubtful should certainly be regarded as cases of tuberculous phthisis, generally of the fibroid variety. Of the 84 cases of Hiller's with reports of autopsies, only 28 should be regarded as syphilitic. The most remarkable article on the subject is that of Pancritius (Berlin, 1881), in which he speaks of syphilitic phthisis as one of the most frequent diseases—one that decimates the flower of the land. Most of the cases he reports are clinical, and consist of rather vague pulmonary lesions, with frequently equally obscure general manifestations of syphilis, which were cured by the use of iodide of potassium. From what can be made of the reports of autopsies which he gives, it would seem that most of the cases were tuberculous. The idea seems also to be held that even a tuberculosis of the lungs could have a peculiar character given it by the presence of syphilis in the individual. Heuop gives a very good report of a case, with a description of the anatomical changes and a plate. In his case there were numerous gummata in both lungs from the size of a nut to that of a goose-egg, without any breaking-down of tissue.

I have gone over most of the literature of lung syphilis, and excluding the congenital syphilis of the lungs in infants and the doubtful cases of adults, the disease seems to be a comparatively rare one. It is difficult to see why syphilis of the lungs should be such a rare disease. That the lungs are so frequently the seat of tuberculosis we can understand from the ease with which the tubercle bacilli can enter them. Of course, the syphilitic virus would not be apt to enter the lungs from the bronchi except in cases of syphilitic ulcerative bronchitis, but one would suppose that they should be equally exposed to the action of the virus as other organs—the liver for example. In the last two years two cases of syphilis of the lungs have died at the Hospital. Both of them were typical cases, and one of them in the extent and the acuteness of the lesions offered the most favorable opportunity for the study of the process. In this case there is an entire absence of clinical history.

The man, J. F., came to the dispensary of the Johns Hopkins Hospital on the 20th of last June. He left the cars a few steps from the dispensary door. He walked with difficulty to the dispensary holding himself up by the iron railings, entered the building and immediately fell to the floor. His face was intensely cyanotic, he gasped for breath, and died in a few minutes. All that could be learned from his friends was that he had been suffering for some time from Bright's disease, and that morning feeling particularly unwell he had determined to apply to the dispensary for relief.

The autopsy was made two hours after death. The body was that of a large, well-nourished man. There were cicatrices and coppery discolorations over the tibiæ, the inguinal glands on both sides were enlarged and indurated, and on the glans penis there was a well-marked cicatrix with a loss of substance of the glans. The cause of death was found to be an acute endocarditis with rupture of the chordæ tendineæ of the mitral valve. There were several distinct ulcerations on the edge of the mitral valve, the chordæ tendineæ of the left flap of the valve were ruptured. The ruptured chordæ and several others were thickened, they had an opaque white color, and were covered with small fibrinous masses. The whole heart was greatly hypertrophied and weighed 730 grms. All of the arteries were thickened. This was most marked in those of small calibre. The aorta was thickened, covered with numerous opaque whitish-yellow patches, and the thoracic portion was generally dilated.

Both the spleen and liver were much enlarged and hyperæmic. The kidneys were very large, both together weighed 700 grms. The surface was slightly mottled, the capsules in most places firmly adherent, the surface sprinkled with minute intensely red points, and around these there were slight opacities. Here and there were larger and more diffuse hyperæmic portions. On section the cortex was thicker than normal, it was moist; the striation was obscure, and there were red points and streaks both in the cortex and pyramids.

In the œsophagus, 7 cm. from the pharynx, there were two superficial ulcers.

In each pleural cavity there were about 200 cc. of clear, slightly blood-stained fluid; both lungs were adherent by a few old fibrous adhesions. The condition of the lungs was most interesting. The right lung was voluminous and did not collapse on removal from the chest. There was an œdema of the entire lung, which was most marked in the lower lobe. The anterior edge and the apex were somewhat emphysematous.

The pleural surfaces were smooth, save for the old fibrous adhesions. Many small tolerably firm nodules could be felt beneath the pleura, along the posterior border of the lower lobe. On section of the lung there were numerous areas of consolidation in the posterior portion of the lower lobe. These areas in some cases were more or less connected with each other. The solid portions on section were of a grayish-red color, the cut surface perfectly smooth and dry; only a little slightly blood-stained fluid could be squeezed from them. In the centres of some of these areas there were white, opaque, irregular caseous masses, with sharp, clear-cut margins. They projected slightly above the surface, were firmly adherent, and with some difficulty could be broken away, leaving a smooth cavity. The caseous material so broken out was very firm, it could not be crushed beneath the fingers nor broken up easily with needles. The lung-tissue between and around these solid areas was intensely œdematous, but after the œdematous fluid was squeezed out the tissue was firmer and more voluminous than normal. The portion of lung so affected comprised about one-third of the lower lobe.

The left lung was voluminous and œdematous. Emphysematous in upper lobe and along the anterior edge of the entire lung. Along the anterior edge of the upper lobe irregular contractions, and below these small stellate cicatrices. In the lower lobe just below the root of the lung was a small induration similar to those in the right lung, and in the centre of this a caseous focus.

The microscopic examination of the kidneys made fresh, and after hardening in Müller's fluid, in alcohol, and in Fleming's fluid, showed numerous alterations. In the fresh sections there was marked fatty degeneration of the epithelium of the convoluted tubules and the smaller collecting tubules. Sections made after hardening in the various reagents mentioned showed marked changes in the glomeruli. The capillary vessels in these were thickened, the thickening being due to the formation of hyaline, some of them were obliterated; portions of the glomeruli and, where the alterations were more profound, the entire structure were changed into masses of hyaline. Along with this there was a marked proliferation of the capsular epithelium, and in some cases there seemed to be a growth of connective tissue from the capsule into the altered glomeruli. The tubes were dilated, filled with granulated detritus, cast-off epithelial cells, and albumin. There was hemorrhage here and there into the capsular space of the glomeruli and into the tubules. There was a general œdema of the kidney and a diffuse formation of connective and granulation connective tissue chiefly around the glomeruli. All of the arteries were thickened. The liver showed atrophy of the liver-cells, a marked hyaline thickening of the capillaries, with dilatation of the lumen. The lesions in the heart were not those of an ordinary endocarditis. Sections of the broken and swollen chordæ tendineæ showed in all of them a necrotic process, with formation of hyaline.

The microscopic examination of the lungs gave the most interesting results. In these the principal lesions were foci of interstitial pneumonia, with central necrotic caseous masses, the foci being separated from one another by a tolerably firm though œdematous lung tissue. We will describe the central caseation, the surrounding interstitial pneumonia, and the intermediate tissue.

Sections were examined after hardening in Müller's fluid and in alcohol. The Müller's fluid specimens were stained in hæmatoxylin and eosin. Examined with a low power, the most striking thing about the caseous areas in most cases was the very sharp limitation of the necrotic process. The necrotic area stained brightly with eosin, and there was an entire absence of nuclei stained with hæmatoxylin. This was particularly marked in the larger and more definite areas. The smaller necrotic foci, though in most cases sharply limited, yet in places seemed to pass into the surrounding tissue, and along the edge there were numerous polynuclear leucocytes which had wandered into the caseous mass. Even with a low power the structure of the lung could be recognized in the caseous tissue. The walls of the alveoli could be made out, they were thickened, and stained more brightly than the contents. In them were irregular masses which with a high power could be recognized as fibrin and large necrotic cells. In many places the alveolar walls were changed into smooth hyaline-looking masses which stained brightly with eosin. The tissue around the larger necroses was a tolerably firm connective tissue, rich in spindle-cells. In most cases this entirely obliterated the lung tissue. Here and there the walls of the alveoli could be recognized, and here and there, mixed with the fibrous tissue were masses of fibrin. The walls of the alveoli were thickened, and in most cases the connective tissue masses seemed to result from this. In other cases there seemed to be a growth of fibrous tissue directly into the alveoli. Around the smaller necroses the fibrinous exudation, with thickened alveolar walls, was the more characteristic feature, and here the whole tissue seemed to become necrotic, the central necrosis enlarging by the advance of the process.

In other cases the induration was not so marked. In place of firm connective tissue there was a loose œdematous tissue which contained very few cells. In this the alveoli could be recognized as small, irregular spaces scattered here and there through the tissue and lined with cuboidal epithelial cells. Most of these were filled with desquamated epithelium similar to that lining the walls. The condition of the lung outside of the connective tissue, in the portions which macroscopically had an œdematous appearance, proved of most interest because here the process was more acute. Even the first glance at this tissue showed a decided atrophy of the walls of the alveoli. The alveoli were distended and filled with large, swollen, pale epithelial cells and fibrin. In some places there were small foci of hemorrhage. Along with these large epithelial cells and fibrin there were small, smooth hyaline masses which varied in size from that of one-half the diameter of a red blood-corpuscle up to that of one of the large epithelial cells. They stained clearly with eosin, and were best marked in the Müller's fluid specimens. Closer examination showed that they resulted from a hyaline degeneration of the epithelial cells. Many of these cells showed various stages leading to complete hyaline degeneration. The most of the hyaline was formed at one point at the periphery of the cell, and in some cases these hyaline masses projected in a polypoid manner from the cell. Other cells had undergone a complete hyaline metamorphosis. The atrophy of the alveolar walls was everywhere marked, but in some places more extensive than others. In the most advanced places no structure of the wall could be recognized, it was changed into a thin, smooth mass of tissue, with but few nuclei scattered along it. In the less advanced cases the capillaries were in great part obliterated. The obliteration of the capillaries was due to a hyaline degeneration of their walls. They were for the most part converted into rigid tubes which remained open on the sections, and many of them were so narrowed that the lumen would not admit the passage of a red blood-corpuscle. The hyaline material in their walls stained slightly with eosin. It was more refractive than the ordinary connective tissue, and was best seen in the sections of the alcohol-hardened tissues which were stained with picro-carmine and mounted in glycerin. In such specimens it was stained a bright yellow color. Here and there the lumen of the vessels was entirely obliterated and they could be followed as rigid hyaline tubes for some distance. Many of the small veins and arteries also contained this hyaline material in their walls, or were entirely obliterated by it. In the immediate neighborhood of the arteries and bronchi there was more formation of connective tissue: the alveolar walls here were thickened and contained numerous small, round cells. In many cases there seemed to be a growth of connective tissue from the bronchi and arteries into the atrophic lung following along the walls of the alveoli. The lung adjoining the areas of loose œdematous connective tissue showed the same alterations. Here the loose connective tissue seemed to proceed directly from the alveolar walls. In this portion of the lung the alveoli seemed rarely to be entirely destroyed, and could be recognized in the small clumps of pale granular epithelial cells distributed everywhere through the œdematous tissue. All of the bronchi in the affected portions of the lung were altered. The most characteristic lesion in them was a decided nar-

rowing of the calibre, the walls otherwise preserving their integrity. The narrowing was due to a growth of connective tissue into the lumen, pushing the epithelium before it. In some cases this took place from all sides, in others there was a polypoid mass of tissue projecting into it from one side and entirely occluding the lumen. In most cases the epithelium was perfectly preserved. In others it had fallen off and lay within the lumen. There was almost an entire absence of leucocytes in the tissue. Only at the edges of the most recent gummata and in a few of the alveoli were any found.

In all the portions of the lung affected there was an endarteritis of the small arteries. In some cases this led to complete occlusion of their lumen. In some of the smallest arteries there was the same hyaline degeneration that was seen in the capillaries and small veins. Sections made through the large bronchus and blood-vessels to the lower lobe showed thickening of the perivascular tissue, with a marked small-cell infiltration of the bronchial mucous glands. There was also a slight endarteritis of the pulmonary artery. The bronchial arteries were not affected.

The other case showed lesions which were less extensive and much more advanced than in the first case. They were further obscured by an acute inflammatory process which did not seem to have any connection with the syphilitic changes. The clinical history of the case is as follows:

M. T., white, female, married, aged forty-three years. Entered hospital October 6th complaining of shortness of breath and œdema of lower extremities. The patient had usually enjoyed good health. Had acute rheumatism several times, the first attack eight years ago, and since then several other attacks, the knees being principally affected. Noticed shortness of breath for the last two years. Of late this has increased. Has a good deal of cough. Swelling in legs began in July and increased very much in the two weeks before admission into hospital. On physical examination there were slight dulness in posterior portions of lungs and numerous liquid râles at both bases posteriorly. On the face and right infra-clavicular region several nodules of ecthyma. On the 13th patient had a chill. Examination of urine showed a large amount of albumin and numerous casts. Patient died October 24th.

At the autopsy there was found a chronic nephritis, heart hypertrophy, and a syphilitic liver. Microscopic examination showed amyloid infiltration of the lower spleen and kidneys. The widespread amyloid degeneration, with the characteristic lesions of the liver, small gummata, and bands of fibrous tissue, leave no doubt as to the correctness of the diagnosis of syphilis.

Both lungs adherent to pleuræ along the posterior portions. Pleural cavities dry. The anterior edges of lungs in high degree emphysematous.

The surface of the right lung was very irregular. It was divided into large projecting masses with deep depressions between them. At the bottom of these depressions the pleura was thickened, and there were masses of connective tissue running from the thickened pleura toward the centre of the lung. Some projecting masses of lung were almost cut off from their connection and were very emphysematous. The alveoli in these portions were plainly visible to the eye, and on pressure the lung substance was very atrophic. All of the projecting masses of lung were emphysematous, some more than others. On section of the lung there were dense masses of connective tissue along the bronchi and great vessels. These bands were most dense at the hilum of the lung and radiated from here to the pleura. They were connected with the thickened pleura at the depressions. This tissue was hard and tough, was almost devoid of air, and of a grayish, slaty color. The large bronchi were slightly dilated. In this thickened tissue there were several caseous nodules surrounded by firm capsules of transparent connective tissue. In addition to the consolidation due to this connective tissue, there was a mottled-red consolidation of the upper half of both lower and upper lobes.

The left lung showed about the same lesions as the right. More than one-half of entire lung was consolidated, both from an interstitial process proceeding along the bronchi and a mottled-red consolidation accompanying this. There were several small, hard nodules beneath the pleura. These were surrounded by zones of fibrous tissue from which bands of fibrous tissue were given off, which penetrated the lung for some distance but were not connected with the fibrous tissue along the bronchi. Pus could be squeezed from all the bronchi in the consolidated lung. Microscopic examination of the fibrous tissue along the bronchi showed a rather loose connective tissue containing few cells. In this there were collections of small epithelial cells and some irregular spaces lined with cuboidal epithelium. These evidently represented the remains of alveoli. From these masses of connective tissue bands were given off which ran through the neighboring lung tissue between the lobules. The bronchi in all this tissue were affected. Most of them showed the same growth of fibrous tissue into the lumen as the other case. Some were entirely obliterated, their place being marked by the remains of the muscular tissue. The lung adjoining these fibrous portions was in a state of acute inflammation. The alveoli were filled with fibrin and leucocytes. The walls of the alveoli were thickened and infiltrated with cells. All of the bronchi were filled with mucus, pus-cells, and desquamated epithelium. Nearly all of the lung not occupied by the fibrous tissue was in high degree emphysematous, the alveoli greatly dilated, and the septa destroyed. The arteries in the fibrous tissue, and in other portions of the lung showed an endarteritis, the lumen often reduced to one-quarter the original diameter, and in some cases a second muscular coat was formed inside the original. The caseous nodules in the indurated portions were typical gummata, and in most of the necrotic material there was complete hyaline degeneration. The nodules beneath the pleura showed a hyaline necrotic centre surrounded by dense masses of connective tissue, with bands radiating from this into the lung.

In this case there was marked destruction of lung tissue. This was caused not only by the direct substitution of the connective tissue, but by its further contraction compressing portions of the lung and giving rise to emphysema of the adjoining portions. To this condition the dyspnœa, from which the patient had been suffering for the two years preceding her death, was due. The chill and the marked increase in the dyspnœa at the last were due to the addition of an acute broncho-pneumonia. In this case all of the changes seemed to have reached their full development. There seemed to be no extension of the gummata nor of the interstitial pneumonia, and the early steps of the process and the advance of the lesions so well seen in the other case were absent.

In the study of the cases the first idea was to attribute all the lesions to the obliterating endarteritis. The formation of interstitial tissue is often seen to be dependent on this. The endarteritis in the first case was most marked; it was acute and seemed to be the same process which led to the narrowing and occlusion of the bronchi and the alveoli.

We believe that for every inflammation, for every interstitial process in an organ there must be a preceding destruction of tissue. This idea of a primary lesion of tissue, which was first advanced by Weigert, can be demonstrated in so many instances, and seems to be too general a pathological law to admit of exceptions. In the first case the very beginning of the lesions could be made out in the atrophy of the alveolar walls. It does not seem at all probable that this was due to the endarteritis, for this was most marked in the most altered portions of the lung, and was generally absent where the atrophy of the alveoli was most marked and the process, as shown by the fibrinous exudation, was most acute—that is, in the tissue outside of and between the interstitial portions. Further, the lesion was too widespread to be the result of an endarteritis, unless of the branch of the pulmonary artery supplying this portion of the lung. There was a slight endarteritis in this, but it was not more than would be accounted for by the destruction of the capillary territory in the portion of the lung involved. The character of the endarteritis would rather lead us to regard it as secondary. There seemed to be no lesion of the muscular coat which might account for it, but the arteries were narrowed by an even formation of connective tissue all around the intima.

The atrophy of the alveolar walls was connected with the most acute changes, with the fibrinous exudation, and with the proliferation of the epithelium; and, as far as could be seen, the hyaline degeneration of the capillaries was the first step in this atrophy. It would be a point of great importance to ascertain whether this lesion in the lungs was caused by the direct action of the syphilitic organism or by some soluble substance produced by the organism and affecting the tissues, somewhat in the manner that the diphtheritic virus acts. The focal character of the lesions in the lungs would lead us rather to regard them as due to the direct action of the organism on the tissues, but very similar lesions were found in the other organs, particularly the kidneys, and here the extent and the diffuseness of the process would lead us rather to regard the lesions as due to a soluble virus. Our total lack of knowledge as to the character of the syphilitic organisms makes this mere speculation, but all of the lesions can be best explained by the assumption of a soluble substance which, having been produced by an organism, enters the circulation and exerts a special action on certain tissues of the body, namely, on the capillary walls. The more careful search of the lungs in both these cases failed to show the presence of any organisms.

It is interesting to find that the essential process in the production of gummata in the lung is a pneumonia with fibrinous exudation, accompanied by fibrous thickening of the alveolar walls, the whole undergoing caseation. It would seem that the gummata were produced where the action of the virus was most intense. Necrosis of the tissue takes place before there is time given for the development of connective tissue. The large gummata which were surrounded by the connective tissue had sharp edges, and there seemed to be no advance of the necrosis. The smaller ones, which were surrounded by the acutely-altered lung with exudation in the alveoli, were increasing by an extension of the necrosis. Where the action of the virus was less intense there was time given for the development of connective tissue, which in some instances seemed to grow into the altered lung from the fibrous tissue around the arteries and bronchi. In other instances the connective tissue apparently developed from the walls of the alveoli.

The close analogy between tuberculosis and syphilis of the lung is shown by the formation of the gumma being essentially a caseous pneumonia. The chief lesions in the tuberculous lung are the results of a caseous pneumonia, but there is a wide difference in the nature of the processes. The tuberculous caseous pneumonia is the direct action of the tubercle bacilli on the tissue. The exudation is almost entirely cellular, and the result is a mass of dead cells which can undergo no further change except a liquefaction of the cells themselves or the substance between them, as the result of either the further action of the tubercle bacilli or other organisms which have entered the tissue. In the gumma the primary process is the atrophy of the alveolar walls, due most probably, to a hyaline degeneration of the capillaries. The whole thing, the epithelial cells within the alveoli, the vessels and the alveolar walls, all gradually undergo the hyaline metamorphosis and become changed into a dense solid mass of hyaline. This hyaline seems to be one of the most resistant substances, and when once formed shows no more tendency to undergo further change than does the closely related amyloid substance. Is there a syphilitic phthisis? We think not. In the syphilis of the lung there is only the production of connective tissue and the dense hyaline gummata. There is an entire absence of the ulcerative processes which we find in tuberculosis. Instead of a caseous bronchitis, with destruction of their walls, there is the same process of connective tissue formation in the bronchi leading to their obliteration that we find in the alveoli. There may be bronchiectases produced by effects of the contraction of the fibrous tissue which has formed around the neighboring bronchi. In some of the other cases reported there were cavities described with perfectly smooth walls, which were almost certainly bronchiectases. One cannot make much of the cases reported. Most of them were published before the discovery of Koch, when our means for diagnosticating tuberculosis were not so accurate as they are now, though even then a close study of the syphilitic and tuberculous processes should have been sufficient for diagnosis, but such close study does not seem to have been made. Even after the discovery of Koch, and the great extension of our knowledge of tuberculosis which this occasioned, a case was recently reported by Potain of mixed syphilis and tuberculosis. The patient had constitutional syphilis. There were large ulcerated cavities in both lungs. In the base of one lung was what the author described as a syphilitic pneumonia. There was a dry caseous consolidation. Tubercle bacilli were found in the cavities, and, strange to say, they were also found in the caseous pneumonia at the base. The author regarded this as an attack of the tubercle bacilli on the syphilitic product.

In both of our cases sections were stained and examined for tubercle bacilli, but in neither case were any found. The point which has come out in this investigation, and which we consider of importance, is the hyaline degeneration of the capillaries. It would not do to generalize and claim this as a special effect of the syphilitic virus in all syphilitic lesions. In the lung it certainly seemed to be the primary lesion. The mode of formation of the gummata by a pneumonia, with a termination in necrosis, is also interesting, because in this way most of the tuberculous lesions in the lungs are formed. The hyaline degeneration of the capillaries, of the cells in the exudation, and of the necrotic masses, would seem to be a special feature in syphilis. Another feature which was most prominent was the absence of leucocytes in the exudation, although all the conditions which they usually accompany seemed to be present. In the first case, on which most of our conclusions were based, they were almost absent in the lesions in all the tissues. It is probable that the hyaline and thickened vessels offered a greater impediment to their exit.

THE JOHNS HOPKINS HOSPITAL REPORTS.

Volume I, for 1889. (The publication of this volume has been postponed for several months owing to the time required for the preparation of additional plates.) It will contain the studies from the Pathological Laboratory.

Volume II, for 1890. The second volume of the Hospital Reports began in January, 1890. Subscriptions will be received for the volume, of about 500 pages, at $5. The price of the separate fasciculi will vary. Nos. 1 and 2 [Medical Report for 1890, by Dr. WM. OSLER] are published at fifty cents each.

No. 3–4 [Report in Gynecology, by Dr. H. A. KELLY] is published at one dollar.

No. 5 [Report in Surgery, I,] is also now ready. It contains a paper by Dr. W. S. HALSTED, on The Treatment of Wounds with especial reference to the Value of the Blood Clot in the Management of Dead Spaces. Price, fifty cents.

THE JOHNS HOPKINS HOSPITAL BULLETIN.

Nine numbers will be issued annually. Volume II is now in progress. The subscription price is one dollar per year. Copies of Volume I, bound in cloth, can be furnished at $1.50.

REPORT ON CASES TREATED BY KOCH'S METHOD.

(*Continued from Bulletin No. 10.*)

DERMATOLOGICAL CLINIC (DR. MORISON).[1]

Lichen Ruber.

CASE 1.—Louisa E., aged 16, entered the Hospital November 19, 1890, covered with an eruption of three years' standing. Her skin was dry, parchment-like, and scaly. It was of a dull red color, and there was some itching. On the back extending over the shoulders nearly to the pelvis was a more recent eruption consisting of small scale-covered papules, discrete and concrete, the base of which had a dull red color. The skin of the palms and soles was thickened, scaly and split into separate ridges. The nails were hypertrophied and brittle, more especially the large toe-nails. The face was also covered with a fine papular eruption similar to that seen on the shoulders. The arms and legs could not be stretched out straight on account of the induration and hardening of the skin around the elbow and knee joints. For the same reason the fingers could not be straightened.

The general condition of the patient was distressing. The appetite was poor and there were headache, furred tongue, slight chills and fever followed by the usual symptoms of final collapse.

A diagnosis of lichen ruber was made to the exclusion of universal eczema or psoriasis.

There had been a similar attack when the patient was 10 years old, from which she recovered after several years' treatment.

On entering the Hospital, with the present attack, she was put upon large doses of arsenic internally, and many different ointments were applied. She did not improve and the prognosis was very unfavorable. Arsenic, which has always been so much relied upon in this disease, had become intolerable to the patient.

In the *Monatshefte für Prak. Derm.*[2] I read that Koch's lymph had been used with benefit upon two cases of lichen ruber and having seen its desquamatory effect in lupus I determined to try it in this case. All other treatment was stopped for 24 hours, the patient was given a warm bath, and at 11.45 p. m. on January 9th the first inoculation of 0.001 was made.

This was followed by a temperature of 100° at four a. m. on the 10th.

The second inoculation consisting of 0.002 was made on January 10th at 8.45 p. m. After this the temperature rose to 103° at 2 p. m. on the 11th. The third inoculation consisting of 0.002 was made at 8 p. m. on the 13th. No reaction. The fourth inoculation of 0.003 was made on the 15th at 8 p. m., which caused the temperature to rise to 104.8° at 2 p. m. on the 16th. On the 18th it went down to 96° at 6 a. m. The fifth inoculation of 0.003 was made at 8.15 p. m. on the 20th, which was followed by a temperature of 104.2° at midnight on the 21st. The sixth inoculation of 0.003 was made on the 24th at 12.30 a. m. The temperature rose to 104° at 6 p. m. of the same day. The seventh inoculation of 0.003 was made at 10.30 p. m. on the 26th. The temperature next day rose to 100°. The eighth inoculation on January 30th, 0.005, at 9.10 p. m. Temperature rose on January 31st to 101° at 6 p. m. The ninth inoculation, 0.005, on February 2d, 10.15 p. m. Very little reaction followed. The pulse never went beyond 124, and the respiration 32.

The changes in the appearance of the skin have been marked. The dull red color has disappeared and the general health of the patient has improved. The face is clear of any eruption, the joints are supple, allowing her to walk and exercise. Palms and soles are almost normal in appearance, and the itching has ceased. There has been great desquamation which has been more noticeable within a few hours after each inoculation. Following this the skin seems to become within a few hours more soft, pliable and healthy. A careful examination has revealed no tuberculous trouble any where. The patient is not cured, but wonderfully improved by this treatment.

Lupus.

CASE 2.—The next case which I show is that of lupus on the face of a mulatto, which was previously reported by me in the *Bulletin* of January, 1891, page 19. She entered the Hospital for the second time on January 26th, and upon that day was inoculated with 0.003 of the lymph. On 27th at 10 a. m., temperature was 103.6°. Second inoculation of 0.005 was made at 9.10 p. m. on the 30th. On 31st at 10 a. m. her temperature was 103.6°. The third inoculation of 0.005 was made at 10.15 p. m., on February 2d. On February 3d, at midnight, the temperature was 103.2°. After the first and second inoculations, the high temperature was followed by a low one which reached 96°. Highest pulse was 140, respiration 30.

Changes in Appearance.

On January 27th, at 2 p. m., the lupus area is hyperæmic, shiny and acutely œdematous. The epidermis resembles overdrawn India rubber. A number of bullae have formed over the surface varying in size from that of a pin-head to a split pea. The upper lip is very much swollen and there are small yellowish scabs on the out and inside of the nose. The tubercular nodules which were plainly seen before the injection, have become swollen and more prominent. At 8.20 p. m. of the same day the œdema and swelling have diminished, the drawn India rubber look having disappeared. January 28th there was a formation of large bullae or blisters on the right cheek, with a scabby appearance. Bright yellowish dried pustules have formed over the separate tubercular nodules on the left side. There is a blister over the centre of the upper lip. January 29th, 3 p. m., general appearance is less hyperæmic, and although the blisters are not so prominent, their number has increased while the œdema has greatly subsided. In the middle of the day there was nose-bleeding for five minutes. The contents of the blisters were examined for tubercle bacilli by Dr. Gilchrist, but none discovered. January 30th, 3 p. m., the whole character of the lupus area has changed. The reddish inflammatory color has disappeared, giving place to mica-like crusts which in a thin and flabby layer cover most of the diseased portion of the skin.

January 31st, after the second inoculation at 3 p. m., there is not so much reaction as after the first. No tubercular nodules

[1] Cases exhibited by Dr. Morison to the Hospital Medical Society.
[2] December 15th, 1890, p. 581.

can be seen on account of the formation of blisters, pustules and scabs. February 1st, 3 p. m., a few fresh blisters have appeared, but the most noticeable change has been the further formation of crusts or scabs, which make a continuous covering of the diseased portion. Upon the removal of any of these crusts healthy granulations appear. The swelling in the mucous membrane of the nose has diminished.

On February 2d, the third inoculation of 0.005 was given, and the changes which have taken place up to date, February 5th, have been in the further formation of crusts which adhere quite firmly to the ulcerated surface beneath, and which cause bleeding upon their removal.

CASE 3.—The next case is that of Mrs. W., previously reported in the *Hospital Bulletin* for January, 1891. The 2d inoculation of 0.001 was made on December 21st. The same reaction took place as after the 1st inoculation. The amount of lymph was increased until she got 0.005 and as there was little reaction from this amount after the 5th inoculation, it was increased by 0.005 at a time until she got 0.030. She has had 16 inoculations with slight rise in temperature only, since the 5th inoculation. Her highest pulse was 103, respiration 32. Lowest temperature was 96°, after the 15th inoculation.

The diseased portion of cheeks and nose has almost healed. There is one small ulcerated patch on left side of nose, the size of a split pea. There are several small red spots left on the cheeks, between which the skin has become white and natural. The ulcerations on the inside of the nose have disappeared, leaving healthy mucous membrane behind. After each inoculation, the diseased area flushes slightly and desquamates to a small degree. The one ulceration left is evidently healing, and she will remain under treatment until it disappears.

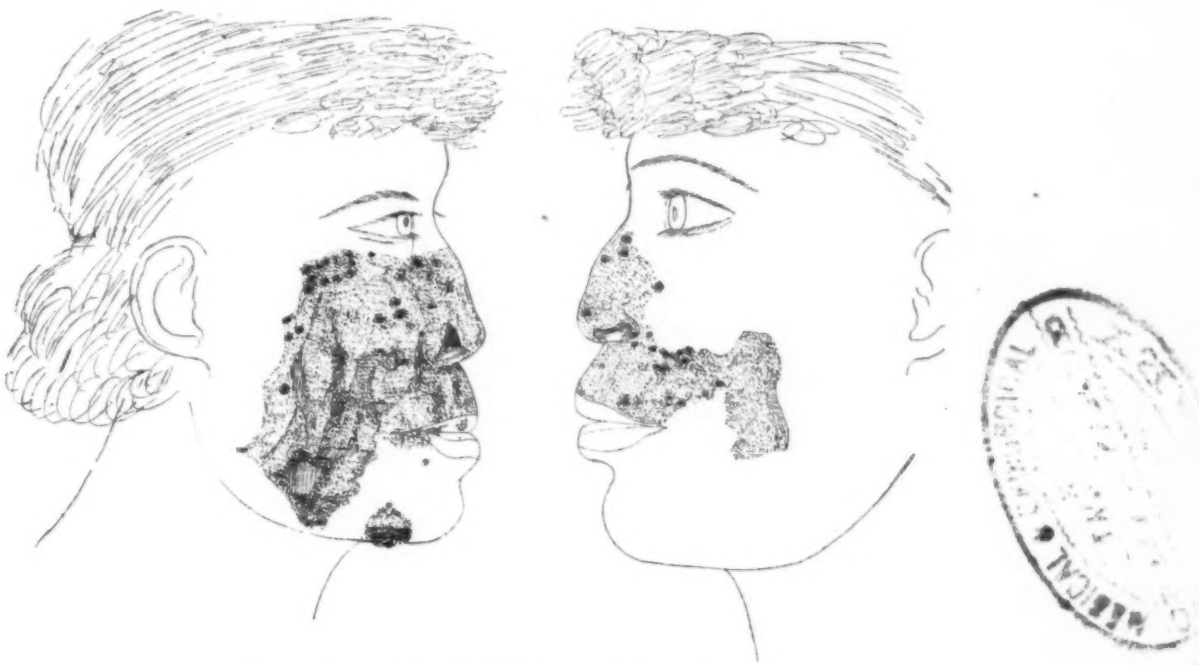
CASE 4.—The fourth case is that of J. C., a youth of 16, whom I treated in the Hospital last year by scraping and caustics. He had a spot of lupus in the middle of the left cheek 2 inches long and an inch wide. He entered the Hospital again January 5th, 1891. He received the 1st inoculation of 0.001 at 9 a. m. on the 6th. At 8 p. m. on the 7th, his temperature was 102°. The second inoculation of 0.002 was made at 9 a. m. on the 9th.

On the 10th, temperature was 104.2°.

The 3d inoculation of 0.003 was made at 4 p. m. on the 12th. On the 13th, at 6 a. m., the temperature was 102.5°.

The 4th inoculation of 0.004 was made at 11.30 p. m. on the 14th. On the 15th, at 4 p. m., temperature was 103.2°.

The fifth inoculation of 0.005 was made at 2 p. m. on the 17th, followed by no reaction.



CASE 2.—Appearance of right and left side prior to inoculation.

The 6th inoculation of 0.010 was followed by only a slight rise in temperature.

The 7th inoculation of 0.015 caused the temperature to rise to 103°, the following day. The 8th inoculation of 0.020 was followed by a temperature of 102.2°. The 9th inoculation of 0.025 was followed by temperature of 102°. After the 10th and 11th inoculations of 0.025 each, the temperature did not go above 101°, but fell as low as 97° for the first time. There has been a decided change in appearance of the diseased skin. After the first few inoculations it became red, swollen and desquamatory. It was surrounded by an erythematous blush, running in streaks down the cheek. After the 11th inoculation the central portion appeared white and healthy. There are a few tubercular nodules on the edges, which are more superficial, less indurated, and smaller than before treatment. In this case there have been no ulcerations. The healing process seems to have gone on by desquamation. The patient is still under treatment.

PROCEEDINGS OF SOCIETIES.

THE JOHNS HOPKINS HOSPITAL MEDICAL SOCIETY.

Meeting of December 15th, 1890.

Dr. OSLER in the chair. 41 members present.

A Case of Brown-Sequard's Paralysis.—Dr. THOMAS.

[To appear in the *Hospital Reports*].

Exhibition of Cases Treated by Koch's Method.—Dr. OSLER.

[See *Bulletin* for December, 1890, p. 108].

Cirrhosis Hepatis Anthracotica.—Dr. WELCH. [See page 32].

Cirrhosis of the Liver with Glomerulo-Nephritis.—Dr. COUNCILMAN.

Dr. Councilman exhibited a specimen of cirrhosis of the liver, with glomerulo-nephritis, from an autopsy made on the preceding day. The liver is a typical specimen of cirrhosis, and is interesting in view of the connection of the umbilical vein with the vena porta and its great dilatation. The umbilical vein was 2 cm. in diameter and communicated with the veins in the anterior abdominal wall which were also dilated. Both macro- and microscopically there was a great increase in the connective tissue of the liver which was not much reduced in size. In every case of cirrhosis there must be some means for carrying off the portal blood, for the portal veins in the liver are obstructed or completely obliterated, by the formation of connective tissue around them. The ordinary means for this are not found in the communication of the umbilical with the portal vein, but in the anastomoses of the portal veins with the lumbar veins and with the veins of the kidney capsule, more especially, however, with the veins of the diaphragm and the œsophageal veins. It is probable that the large vein in this case is not the former umbilical vein but one of the small veins in the round ligament which has become thickened and dilated to its present size.

The spleen of the man presents the ordinary type of the spleen accompanying cirrhosis of the liver. It is very much enlarged, its surface is smooth, it has a dark red color and on section its tissue is much firmer than normal. This increase in the consistency of the organ is brought about by an increase in the connective tissue which always follows long standing congestion.

The chief interest in the case centres in the kidneys. The man had evidences of renal disease when he first entered the hospital, the symptoms of this increased in severity during his stay; at the last there was a great diminution in the amount of urine; and death resulted from uræmia. The kidneys are cased in large masses of fat. The capsule is easily removed, in fact the pressure of the kidney inside the capsule was so great that on making a section through it into the kidney the cut surfaces of the capsule separated. The surface of the kidney is smooth and red, with here and there intensely red points. On section the cortex is red, much wider than normal, with here and there small red points and some paler areas. There is no sharp separation of the cortex from the pyramids. The malpighian bodies can be seen on the section but they are pale. Macroscopically, there is little that would call special attention to the kidney save the congestion and the increased width of the cortex, and on a casual microscopic examination there seems to be but little alteration. On more careful examination, however, one sees that the glomeruli are larger than normal and that the cells in them are greatly increased in number. This is the most striking thing which the fresh sections show; in addition to this some fatty and granular degeneration of the epithelium. Where thin slices of the kidney are thrown into boiling water and then frozen and cut, the glomeruli are found to be almost bloodless, and then the increase in the number of cells is much more apparent. There has been, for some time, a controversy among pathologists, as to the situation of these cells in the glomerulus and their origin. The determination of the exact nature of the lesions in the glomerulus is probably the most difficult problem in pathological histology. The chief difficulty is in determining whether the cells which are so greatly increased in number are within or outside of the capillaries. From all that could be seen in this case they certainly are within the vessels. As to the origin of these cells they can have but three sources. They come from a multiplication of the cells of the capillaries, or from the connective tissue which enters but slightly into the structure of the normal glomerulus, or from the epithelium. Certainly the weight of evidence shows that they are derived from the cells of the capillaries.

[Further examination of the kidney, portions of which were hardened in Fleming's solution, revealed more complex lesions than were apparent in the fresh sections. The most important and first step in the production of the lesions is a thickening of the capillary walls of the glomerulus. This thickening is due to the formation of a hyaline refractive substance. Sometimes the capillary wall is simply thickened, but oftener there are projections of the substance within the vessel and in some cases a coarse network is formed. Along with this there is a multiplication of the cells of the vessel. These cells do not lie free in the vessel but they are within this hyaline substance. This goes on to the complete obliteration of the vessels which become changed into solid masses of hyaline substance. When this takes place the cells atrophy and the result is a conversion of the glomerulus into a solid mass of hyaline material. This process in the capillaries is accompanied by a thickening of the capsule and a proliferation of the covering epithelium].

Meeting of January 5th, 1891.

Dr. OSLER in the chair. 60 members present.

The Koch Treatment of Tuberculosis at Berlin.—Dr. ABBOTT.

[See *Bulletin* for January, 1891, p. 4.]

Case of Lupus Vulgaris Treated by the Koch Method.—Dr. MORISON.

[See *Bulletin* for January, p. 15].

Case of Tuberculous Peritonitis Treated by Koch's Method.—Dr. KELLY.

[See *Bulletin* for January, p. 15].

Cases of Pulmonary Tuberculosis Treated by Koch's Method.—Dr. OSLER.

[See *Bulletin* for January, 1891, p. 7].

Obstruction of the Superior Vena Cava.—Dr. OSLER.

This patient, M. H., aged 31, varnisher, applied at the dispensary October 4th, 1889, complaining of swelling of the face and neck. He had always enjoyed good health and there was nothing special in his family history. Five years ago he noticed slight enlargement in the right side of his neck and some months afterwards swelling of left side. It did not, however, distress him particularly and it was not until about Christmas, 1887, that the face began to get flushed and the veins to swell, and that he noticed slight swelling in the right arm-pit. For more than a year he has had shortness of breath on exertion with great lividity of the face. Some of these attacks of dyspnœa, from his description, must have been very bad. I dictated the following note on the day of his application:—"Small, spare man, face suffused and slightly livid, conjunctivæ watery; neck is much enlarged, the right more than the left side. On palpation the glands are hard, firm and solid. The groups in the anterior and posterior cervical triangles are uniformly enlarged. No enlargement of the axillary glands. When stripped, the manubrium is seen to be prominent and the superficial thoracic veins are very distinct. There is a great enlargement of the epigastric veins; those of the right side more than those of the left. Some of the branches are as large as the little finger. On palpation of the chest there is a curiously soft feel beneath the skin of the anterior part, due to presence of bunches of enlarged veins. There is marked tenderness on deep pressure on the manubrium; no pulsation. The sternal notch is obliterated. Expansion of the chest is equal; apex beat is not visible, not palpable. On percussion the entire manubrium is dull and there is defective resonance on the left side in the infrascapular and mammary regions, as low as the nipple and as far out as the nipple line. On the right side, percussion is

clear. Posteriorly there is no definite dulness in the interscapular region; bases are clear.

"On auscultation heart sounds are well heard; no murmur; they are not accentuated at the base or on the manubrium. Respiratory murmur very feeble and distant in left infra-clavicular and mammary regions. Behind very much feebler on the left side than on the right, with a few râles on deep inspiration. The radials are equal. There is no lividity of the hands. Examination of the abdominal organs negative."

Patient had taken iodide of potassium, and he was placed upon the Fowler's solution, 5 drops, three times a day.

Throughout October, November and December he improved a good deal and gradually increased the Fowler's solution to 12 minims, three times a day. The glands on the left side of the neck became smaller and the engorgement of the face not so extreme. On the night of the 22d November he had a very bad smothering attack, with urgent dyspnœa and spat a good deal of blood. The right pupil is contracted, differing markedly in size from that of the left. It reacts to light. He took the arsenic until January 18th, when, owing to the development of a skin rash, it was thought advisable to stop it. The swelling of the neck has decreased remarkably and his face is not nearly so suffused.

Throughout the Spring and Summer he continued to improve and the neck reduced materially in size. The venous engorgement of the veins of the thorax and abdomen increased somewhat. He took the Fowler's solution steadily, omitting it for a week or so at a time. On the 4th of September I made the following note:—"The neck has greatly reduced in size, though the glands are uniformly enlarged. The face is flushed, but no longer livid. The plexus of veins from the sternum is now enormous, extending on both sides to a line with the nipples. On palpation it feels like a soft spongy mass. In one of the distended veins a phlebolith can be felt. The epigastric veins are still large and prominent. The condition of the chest remains practically the same. Dulness extends over the whole of the sternum and the left infrascapular and mammary regions. The apex beat is not visible, nor palpable. The heart sounds in nipple region are clear and well heard towards the base; no murmur; no venous hum."

Since that date the improvement in his general condition has continued. The face is still congested, particularly on exertion. The bunches of lymph glands in the neck have reduced in size. The signs of mediastinal tumor persist. The collateral circulation seems now to be fully established. The front of the chest is, as you see, a mass of enlarged tortuous mammary veins, through which by their connections with the epigastric vessels the blood of the heart and arms reaches the inferior cava.

Dr. OSLER remarked that pressure of lymph-adenomatous growths in Hodgkin's disease was one of the commoner causes of obstruction in the superior vena cava. In this case the obstruction was probably complete. Another case had been under observation in which the pressure was due to an aneurism.

One of the most interesting features in the case was the remarkable reduction in the size of the tumors under the use of arsenic in increasing doses. He has lately been taking as much as m. xv of the Fowler's solution three times a day.

Meeting of January 19, 1891.

Dr. OSLER in the chair. 40 members present.

A Case of Abdominal Tuberculosis.—Dr. BOOKER.

This child, aged 8, was brought to the Dispensary ten days ago complaining of pain in the abdomen with a tired feeling and drowsiness. The pain comes in paroxysms, and usually there are one or two attacks during the night.

There are four children in the family, the other three are fat and healthy; one child died in infancy of summer diarrhœa; parents are healthy, though the mother has a delicate appearance; she has not had a miscarriage. Both grandfathers died of consumption.

This child has generally been healthy, but never as fat as the other children. She had measles and summer diarrhœa in infancy and measles again last April. She has been gradually losing flesh for a year, and in the last eight weeks the wasting has been more rapid. She has had no cough, vomiting or diarrhœa; the bowels move regularly once or twice daily, and the stools have a normal appearance. She complained of pain in the abdomen during the attack of measles last April, but it soon passed off, and was attributed to the effects of the measles or worms. During the summer she was in fairly good health, and started to school in September. In November she became feeble and drowsy and had severe pains in the abdomen, which led to a physical examination, and, according to the father's opinion, the abdomen was in the same condition at that time as it is now.

Present condition: The child is well grown, pale and thin; respiratory sounds are healthy; a haemic murmur is heard over the base and apex of the heart; liver and spleen slightly enlarged. The abdomen is tense and a large, resisting, movable mass occupies nearly the whole of the left side of the abdomen; an intervening space can be felt between this mass and the lower end of the spleen; several small lumps can be felt on the right side of the abdomen. The middle and most of the right side of the abdomen are tympanitic, and in the lower part there is dulness, which is not altered by change of posture. There is only slight pain on pressure over the abdomen. Lymphatic glands of the neck and groin are enlarged. Examination of the blood shows a slight leucocytosis. Morning and evening temperature, 100°. Weight 44 pounds.

There has been some improvement since the child came to the Dispensary; she looks better, has more inclination to play with the other children, and does not complain of any pain.

The treatment is conservative, consisting of quinine and arsenic, with rest and nutritious diet.

The case is interesting in showing to what extent the disease may develop before attracting attention.

Dr. OSLER:—The question of operation in a case of this sort is not quite clear to me. There are two conditions in tuberculous peritonitis in which not much can be gained by laparotomy. The one a chronic adhesive peritonitis, and the other, when large caseous masses exist, matting the coils closely together. This case appears to me from the character of the tumor masses to be of this latter nature. There is not large effusion.

Cases of Perforating Ulcers.—Dr. THOMAS.

I wish to present this evening two patients, each having an ulcer on the sole of the foot. The first is certainly an example of the so-called perforating ulcer, occurring in connection with locomotor ataxia. This case is especially interesting as the patient presents very few nervous symptoms, and it was through the recognition of the character of the ulcer that we were led to make a more thorough examination, which revealed his true condition. The patient is a colored man, 58 years old. He gives a rather uncertain history of having had syphilis. He has had no headache nor double vision nor ptosis. For the last three or four years he has had a gradual loss of sexual desire and some difficulty in passing his urine. For several years he has been annoyed by a sense of numbness in the hands, and of late he has had difficulty in holding light objects and in fastening his clothes. There is no history of the characteristic lightning pains, and he has had no noticeable difficulty in walking. For the last five years he has been worried by corns on the plantar surface of each great toe. These were very hard, and he was in the habit of cutting them. In February of 1888 an ulcer developed in the corn on the right foot, which he says looked as if it had been punched out by a pistol-ball. This ulcer has never healed since that time.

The patient has very markedly contracted pupils, which do not react to light. There is a slight but evident decrease in the sensibility of his hands; he is unable to recognize small objects upon which his hands are closed. No positive incoördination can be made out in the movements of the arms. He stands steadily with feet together and eyes closed, but is unable to stand on one foot. His walk is not ataxic; he, however, has some difficulty in going up and down steps. His knee-kicks are absent on both sides, and there is a slight dulling in his perception of pain. The ulcer on his right toe is about the size of a ten cent piece. Its edges are sharply cut and it involves the deep tissues. There is and has been very little pain in connection with it. In the centre of the corn on the left toe there is a small loss of substance which suggests the commencement of another perforating ulcer.

The second case is not as clear either as regards the ulcer or the diagnosis of his general condition. He is suffering from an organic nervous disease, following great alcoholic excess, which is probably an unusual form of neu-

ritis. The ulcer, although not typical, can, I think, be fairly considered as another example of perforating ulcer of the foot.

Patient is a farmer, age 33. For six years before the commencement of his present trouble he was almost constantly under the influence of alcoholics. Three years ago he had an attack of delirium tremens, which was immediately followed by great difficulty in walking. He could only walk a few steps and his legs felt dead. Complained of but little pain. No incontinence of urine. Thinks that from the very first he had disturbances in sensation in his legs, especially the right. These symptoms have gradually improved.

The ulcer was preceded by a corn on the ball of the left foot. It looked at first as if it had been punched out, the edges were clean cut. The patient has noticed himself that the ulcer has given him very little pain.

He now shows marked ataxia in the legs, is unable to stand with feet together and eyes closed, cannot walk in the dark, knee-kicks are active on both sides. No reflex from tendo Achillis. Plantar reflexes active. No spastic condition. There is some wasting in muscles moving the foot, and their strength is subnormal. No marked electrical change in these muscles; they perhaps respond less readily to the currents. Sensation is disturbed in feet and lower legs. Area about ulcer is very anaesthetic. The ulcer is healing.

In connection with these cases Dr. Thomas said that perforating ulcers occur most frequently in connection with locomotor ataxia, but are also met with in other nervous diseases, especially those in which the peripheral nerves are involved, and that it was a mistake to think that they were never cured. Both of the ulcers shown to-night had improved very much under simple surgical treatment.

Report of Cases of Alcoholism.—Dr. Latimer.

Dr. Latimer said that since he had assumed medical charge of the Baltimore City Jail, he had treated during the period from April 11 to December 31, 1890, 958 cases of alcoholism, of which 40 suffered from acute excitement or mania a potu. The average duration of the mania in each case was 48 hours. All of these patients were admitted drunk: and most of them had had previous attacks of delirium tremens. Many of them were also addicted to the use of chloral and opium in addition to alcoholics. Nearly all of the total number had tremor; pains in the head and muscles: loss of appetite and frequently vomiting. The 40 who had mania were usually noisy. As to treatment, he would say that no stimulants were given in any case. The uniform prescription was 30 grs. of bromide potassium every two hours in maniacal cases, and every three or four hours in other cases. In cases of noisy mania one-fourth grain of morphia sulphate was occasionally given hypodermically at bed-time. There were no fatal cases. All recovered. Not only were stimulants withheld, but the food was imperfectly adapted to their needs.

In view of these facts he was disposed to think that alcoholism was not due to a suspension of stimulants nor to the indisposition to take stimulants. Further, he did not regard the administration of stimulants as necessary to treatment. On the contrary, he was of the opinion that many cases of delirium tremens had a fatal issue in consequence of the administration of stimulants.

Dr. Hurd said:—It has always been a matter of regret to alienists that a more careful distinction was not drawn by physicians between *mania a potu* and *delirium tremens*.

In mania a potu, we have an attack of insanity due to the direct influence of the alcoholic indulgence upon the brain, producing a well defined maniacal excitement.

In delirium tremens, we have rather a disorder of the nervous system. In the latter instance, the disturbance seems to be due largely to the fact that the stomach becomes disordered; the patient is unable to take the accustomed amount of the alcoholic beverage into his system, and the nervous system feels the effect of its withdrawal; and tremblings, hallucinations of vision, and other nervous disturbances follow.

In mania a potu, we have a simple maniacal excitement, due to alcoholic indulgence, a mental disturbance which differs in no respect from any other simple psychosis.

If the distinctive characteristics of these two forms of nervous disease be borne in mind, their treatment will be indicated.

In mania a potu, the patient should receive the same treatment as for any other form of maniacal excitement.

In delirium tremens treatment should be addressed more to quieting the disturbance of the nervous system and preventing a patient doing himself or others harm, until the system becomes accustomed to the withdrawal of the alcoholic drink. Hence, in delirium tremens, the use of bromide of potassium to quiet the nervous disturbance and sustaining doses of some heart tonic, are especially beneficial.

Dr. Finney said:—Dr. Latimer's paper recalls to my mind a group of four or five cases occurring during my term of service as resident surgeon in the Massachusetts General Hospital, in which the symptoms of delirium tremens were not observed until several days after the patients had entered the wards. All were brought in intoxicated, and suffering from severe injuries. These cases if, I remember rightly, all pursued a more or less chronic course, the delirium lasting for some weeks, and was at times violent. The bromides and chloral were given in large doses without any very appreciable effect. Various other drugs were tried with a like result. Marked improvement was observed after the hypodermic administration of the sulphate of strychnine, and the tincture of nux vomica by the mouth, up to the physiological limit. The good effects of this treatment were noticeable after a day or two. All of the cases recovered I believe, except one, which had other complications.

Exhibition of Specimens.—Dr. Robb.

(*a*) Cysto-Sarcoma of the Ovary.

The first specimen which I will exhibit this evening was removed by abdominal section by Dr. Kelly.

The history is as follows: Mrs. J. G., aet. 45, admitted November 19th, 1890. Married 27 years. No miscarriages. Labors hard, but non-instrumental.

She menstruated when 14 years old, and her menses have always been regular, lasting five days with a moderate flow, without pain. She has at present a slight leucorrhoea. She has never had any serious illness. Two years ago she first discovered a small lump in the left ovarian region, which was painful at times. This grew very slowly until a few weeks before her admission when it increased rapidly in size. During the past two years she complained also of weakness and giddiness.

On examination per vaginam a hard rounded semi-fluctuant mass was outlined filling the left side of the pelvis and extending up in the abdomen as high as the umbilicus. A diagnosis of intra-ligamentous ovarian cystoma was made. There were no renal complications. Abdominal section was performed November 21st under chloroform narcosis. The cyst was readily evacuated through an abdominal incision 8 cm. in length. There were no adhesions. In order to remove the intra-ligamentous mass it was necessary to enucleate the broad ligament on the left side from the pelvic wall to the cornu of the uterus, using ten stout ligatures. The top of the pedicle looked sarcomatous and a deeper layer of ligatures was applied allowing its removal down into healthy tissue. On the right side the ovary and tube were small, withered and adherent; these structures were not removed.

In making the toilet of the peritoneum the pelvic cavity was irrigated with sterilized salt solution; a drainage tube was inserted and the incision closed. The tube was removed on the third day, and the stitches on the tenth, the incision being perfectly united throughout. Her convalescence was normal, the thermometer registering normal throughout, except the night temperature of the third and fourth days when it rose to 38.2° C. She was discharged December 19th, twenty-nine days after the operation, looking well and feeling strong enough for a journey of several hundred miles.

The tumor is composed of two portions. There is a dense solid mass 12 x 9 cm.: on section it has a dry grayish-white appearance, and presents a faint indication of lobulation.

There are apparently bands of connective tissue running through it accompanying blood vessels. In the middle of the tumor there is a section of a large vein. This solid mass of the tumor had grown into the broad ligament, which nearly completely enclosed it, forming a hood. On the upper edge of this hood is the elongated, thickened and dilated fallopian tube 17 cm. in length. The other portion of the tumor is a large cyst. This cyst contained over a litre of fluid: which was examined by Dr. Williams, who reported a peculiar green non-viscid liquid, sp. gr. 1020. On heating it gives a precipitate of serum albumen, and on passing Co_2 through it a copious precipitate of par-albumen is thrown down. It contains small non-nucleated granular cells resembling the Drysdale corpuscle.

On its inner surface this cyst consists of two parts, one immediately over the tumor which is smooth and shining, the other is roughened and is covered with excrescences, and whitish opaque patches which after hardening in Müller's fluid can be pealed off. The cyst is joined all around to the edge of the solid mass. There is a distinct line between the portion over the tumor and the other: one surface being smooth and the other as described.

On the outside the cyst wall is differentiated from the peritoneal surface of the broad ligament, the line of union between the two being perceptible; the cyst wall being much rougher. The dilated tube opens directly into this cyst. There are elevations of a reddish-like tissue which proceed from the tube and spread out on the cyst wall.

Here and there the cyst wall is a good deal thickened.

The cyst wall examined microscopically is composed of dense connective tissue. Here and there over the surface corresponding to the reddish projections it is lined with high cylindrical epithelium, some of the cells being ciliated. In places there are distinct papillary growths covered with the same epithelium. In other places the epithelium is low and columnar.

The solid portion of the tumor is a sarcoma composed of spindle and round cells. The cells are generally arranged in bundles which are separated by cellular connective tissue containing blood vessels.

From this examination we should suppose that there was originally an adherent tube to the surface of the ovary. The latter enlarged by the development of the sarcoma and from its continual enlargement, the cyst was formed from the adherent fimbriated extremity of the tube.

(*b*) ATRESIA OF VAGINA, ABSENCE OF CERVIX UTERI WITH A DOUBLE DERMOID CYST COMMUNICATING WITH AN ADHERENT LOOP OF THE ILEUM.

This patient was admitted to the medical ward. Autopsy made July 17th, 1890.

This specimen comes from a woman who died of diptheritic colitis with amyloid degeneration of the liver, kidney, and spleen, and chronic Bright's. She was a married woman and had several children, but the date of the last confinement is not known.

The examination of the pelvic contents shows an interesting and complicated condition. The bladder is normal; a probe passes easily into the dilated ureters.

The vagina is a cul-de-sac 4 cm. long, smooth, at the apex of which there is a small stellate cicatrix with a central depression.

3 cm. above the termination of the vagina is a portion of the uterus, evidently the fundus. Between the vaginal termination and the commencement of the uterus is a mass of dense cicatricial tissue.

The portion of the uterus present is 4 cm. long by 4 cm. broad: almost globular in shape. In the interior of it is a cavity with no external opening, filled with whitish glairy contents, and with small projections on the surface of the mucous lining. This cavity extends on either side into the cornu, but the connection with the fallopian tubes cannot be traced. Above the uterus attached to it, on the left side is a tumor mass 6 by 3 cm. filled with stinking fatty contents. Its walls are covered with a short reddish hair which can be easily pulled out. In places, the lining seemed to be necrotic. Outside of this is a convoluted cyst filled with clear watery contents and on its inner surface are numerous trabecular projections. There is no connection between the two cysts. Just posterior to the uterus and the dermoid cyst is a cavity filled with very offensive contents, among which are some loose hairs. This cavity communicates by an opening 2 mm. in diameter with the dermoid cyst. Attached to the right cornu of the uterus is another cyst filled with stinking material containing a few loose hairs. This cyst is 5 by 3½ cm. It communicates with the cavity back of the uterus and the first cyst. Just at this juncture there is an adherent loop of the ileum about 80 cm. from the valve, which communicates with the general cavity by a very minute opening. The whole pelvic contents are embedded in a dense mass of cicatricial tissue, which is with difficulty separated from the pelvic walls. Microscopical examination reveals only cicatricial tissue.

The specimen then consists of two dermoid cysts which communicate with each other by a small cavity back of the urerus. This cavity and consequently both dermoid cysts communicate with the ileum through a small opening in an adherent loop. The specimen shows the complete absence of the greater portion of the uterus. The space between the vaginal cul-de-sac and the fundus of the uterus having been probably occupied by the cervix. It is impossible to say whether this has been the result of an operation or from an extensive sloughing of the uterus at the time of the last confinement. It was not possible to get any history from the woman relative to the condition of the parts here. If the result of an operation for carcinoma of the cervix, it was most successful. The small cyst with clear contents on the outside of the left dermoid is probably a cyst of the fallopian tube on that side. Nothing could be seen of the other fallopian tube. It is most probably lost in the mass of connective tissue. It is of further interest to note the association of amyloid change with this condition.

Exhibition of Specimens.—Dr. COUNCILMAN.

Dr. Councilman exhibited a specimen of aneurysm of a branch of the pulmonary artery. The specimen was from a tuberculous individual who died from hemorrhage. There were large cavities in the right lung which were filled with coagulated blood. In one of these cavities there was an erosion of a branch of the pulmonary artery about ¾ of a mm. in diameter. The artery opened directly into the cavity. This was evidently the source of the hemorrhage. In the large cavity in the lower lobe there was an aneurysm as large as a pigeon's egg. It was filled with coagulated blood, the walls were 2½ mm. in thickness. The aneurysm was perfectly intact. It was seated on the side of an artery which ran along the wall of the cavity and was finally lost in it. The source of the hemorrhage in this case was interesting. The most common source of fatal hemorrhage in phthisis is from the rupture of such an aneurysm as this, and it must always be looked for at the autopsy. It is often very difficult to find when very small. In this case the aneurysm was found but it was intact, the hemorrhage coming from the direct erosion of a vessel which is a much more infrequent source. These aneurysms of the pulmonary artery along side of tuberculous cavities in the lung are not very rare. They may be so large as to entirely fill up the cavity into which they project. Their formation is due to a weakening of the wall of the artery where it is attacked by the tuberculous process, the tissue which is substituted for the normal arterial wall being weaker and not capable of resisting the pressure of the blood. In an autopsy made some years ago two such aneurysms were found in the same lung, the rupture of one of them causing fatal hemorrhage.

A second specimen of multiple aneurysm of the aorta with bronchiectasis, coming from a syphilitic subject was exhibited. The case was a private patient of Dr. Lockwood's, with the following clinical history. W. T., mulatto, aet. 37. In 1886, when riding as a jockey, he was thrown from his horse and injured. In 1875 he was infected with syphilis. Has been employed as a domestic servant and in that capacity had to lift an invalid lady frequently during the day. Was well until January, 1889, when he suffered from pain in sternal region and in right side. The pain was sharp and acute, prevented him from sleeping and was relieved by a sitting posture slightly bent forward. With the pain there was more or less cough but he continued at work except for intervals of two or three days. In February and March of 1889, he spat blood on several occasions. In August, 1889, a diagnosis of aneurysm was made. In the latter part of August he suddenly became aphonic and the laryngoscopic examination showed the left vocal chord to be unmovable. Since August, 1889, large doses of Iodide of Potassium have been given with excellent results. The general health became better and the weight increased. On January 16, he spat up several mouthfuls of firmly clotted blood. Shortly after this he was found in a state of collapse and died at 7.30 p. m. The diagnosis of aneurysm of aorta with hemorrhage was made. At the autopsy there was found an extensive endarteritis which was almost confined to the aorta, even the arteries given off from the arch showed little if any change. The aorta was thickened, covered with irregular elevations, but there were no calcified patches. The heart was not hypertrophied and the valves were normal. There were two aneurysms of the aorta. A small one with a second dilatation of its wall, which sprang from the lower portion of the arch and projected downward to the aortic valves, and a large one which sprang from the posterior side of the aorta shortly below this. The opening of this into the aorta is 7 × 4 cm. It was filled with firm laminated fibrin and dark coagulated blood. It had opened into the œsophagus at about its middle and a large clot projected from the aneurysm into this. Just

above this there was a projection into the œsophagus corresponding to the upper margin of the aneurysm. On section here it was found that the wall of the aneurysm had entirely atrophied and the fibrin lay against the muscular wall of the œsophagus. The stomach was dilated and filled with firm dark blood clots.

There was a general bronchiectasis of the left lung which was most marked in the lower lobe. The bronchi were dilated, filled with dense stringy masses of muco-pus, and there was some consolidation of the surrounding lung tissue.

The endarteritis and the aneurysm formation should certainly be referred to the syphilitic infection. In two cases of lung syphilis which were recently reported by the writer, the essential lesions were found to be an atrophy of the alveolar walls due to hyaline thickening of the capillaries. It seemed possible that in this case the bronchiectases might be due to a similar cause for there were found here and there hyaline capillaries in the walls of the dilated bronchi.

Dr. Osler:—The condition of the lung in this case is perfectly familiar to me, both clinically and anatomically. It results from compression of the main bronchus, or of the lung itself, by the aneurism. A distention of the bronchi, a peribronchial pneumonia, and sometimes softening and suppuration with cavity formations may result from this. We used to call these cases, at the Montreal General Hospital, aneurismal phthisis.

Twin Pregnancy. Breech and Transverse Presentation. The Placentae and the Membranes.—Dr. Kelly.

Dr. Kelly: I exhibit here the placentae and membranes of a case of twins. The diagnosis of twins had been made by palpation three weeks before the confinement. There was a breech presentation of the child lying to the left side, its sacrum being anterior, the head lying in the epigastrium and left hypochondrium. The head of the other child could be felt in the right hypochondrium.

Combined palpation through the vagina and abdomen, acting on both poles of the foetus upon the left side, showed that the body between the hands was one and the same body, by the direct instant transmission of all impulses, given the cephalic extremity, to the breech lying in the pelvis, while movements communicated to the head of the other twin in the right hypochondrium were not so transmitted. The pulse of the child on the left was distinct, near the umbilicus, that on the right could not be heard. Palpation revealed the fact that the twins were small, although the abdominal circumference at the umbilicus was 108 cm.

In the early months of pregnancy, this patient suffered from retroflexion of the gravid uterus, which I corrected at four months under an anæsthetic, pushing the uterus up into the abdomen.

Labor came on, the cervix dilated, and with the rupture of the membranes there was an extensive prolapse of the long umbilical cord of the foetus on the left side. It was impossible to return the cord, and as its pulsations became very feeble, I caught the child by the feet and drew it down and rapidly delivered it. It breathed well after a few minutes. Following the birth of the first child, there was a cessation of pain, but there occurred an alarming hemorrhage from its placental site. I therefore administered chloroform and proceeded to empty the uterus. I found the placenta of the first child lying just within the cervix, having been detached. This was perforated and the second child found in a transverse position, with its back anterior, buttocks to the left. The feet were grasped, brought down and the child delivered gasping.

The mechanism of the production of this transverse presentation is interesting. Its breech at no time presented, but lay to the right of the cervix, then when the pains carried the detached placenta of the first child down, filling the lower segment of the uterus, the next uterine contraction forced the head of the small foetus down to the left and the buttocks slid up on the right side, the body with the placenta making one common ovoid mass.

The children, although immature and weighing but three and a half pounds (1587 gr.) each, lived three days.

This mass which I here exhibit is the placentae and membranes. Considerable interest attaches to the placentae of twins, not only from the fact that a twin pregnancy is unusual (about 1 in 89 according to Veit), but because we are thereby often able to determine an intimacy of connection between the twins in their intra-uterine life, possibly explaining to some degree the remarkable similarity of such children.

Twin placentae and membranes are of two kinds, one in which the twins have sprung from a single ovum, while in the other they are developed from two separate ova.

In the first instance, both the twins may also rarely be found included within a single amniotic sac. Here, however, oftentimes traces of a partially formed amnion can be distinguished upon the placental surface.

Usually there are simply two distinct amnia, forming a perfect septum between the children. Such twins are always of the same sex.

In the other class of cases, where the twins arise from separate ova, each not only possesses its own amnion, but between the amnia are found the remains of the chorin, indisputably proving the fact that they arose from distinct ova, whether from the same Graafian follicle, from two follicles in the same ovary, or from opposite ovaries is not so important.

Why the amnion and the chorion are thus the distinguishing factors in the case will be readily understood when we recall the elementary facts in embryology, that the amnion is a product of the germinal area within the ovum, and if there should be as many as three such areas in one ovum, each would develop its own amnion, if as many embryos formed, as it is simply a part of embryonic cleavage system in the process of the formation of the organism, while the chorion on the other hand has no such intimate relation to the foetus, being but an adventitious shaggy envelope covering the whole outside of the ovum. If, therefore, there be two chorin there must be two ova.

Here are two placentae, two amniotic sacs, and in the septum between the amniotic membrane is a distinct chorionic layer.

This case also shows a remarkable torsion of one of the cords, while the other is absolutely straight without a single twist in the umbilical arteries from foetus to placenta. It further shows on both of these placentae the interesting condition known as placenta marginata. At this semi-lunar ring, somewhat thickened and whitish on each placenta, the chorion and the amnion leave the placental surface, instead of leaving it normally at the placental margin. The frequency with which this has been observed in such twin placentae as these, has been adduced by Krukenburg, as proving that the placenta marginata arises from a growth in the placenta exceeding the growth of the corresponding area of the uterus, as first stated by Kuestner.

Report of Bacteriological Study of Diphtheria.—Dr. Welch and Dr. Abbott.

[See page 25.]

HOSPITAL JOURNAL CLUB.

Regular meeting, Monday evening, January 26th, 1891. Fourteen members present. Dr. Abbott in the chair.

Reports and abstracts were made as follows:—

Gynecology.—Dr. Robb.

Brandt's System in Gynecology.
(*The New York Medical Journal*, Jan. 24th, 1891.)

Obstetrics.—Dr. Farr.

A Case of Retention of Foetus. *Macon.*
(*British Medical Journal*, Dec. 27, 1890.)

Modern Methods of Treating Lingering Labor. *Playfair.*
(*British Medical Journal*, No. 1552, 1890.)

The Transmission of the Bacilli of Typhoid Fever from Mother to Foetus. *Giglio.*
(*Centralblatt für Gynäkologie*, No. 46, 1890.)

Prolapse of the Urethral Mucous Membrane in Young Girls. *Benicke.*
(*Zeitschrift für Geburtshülfe und Gynäkologie*, Band XIX, Heft 2.)

Bacteriology and Hygiene.—Dr. Abbott.

Beobachtungen ueber die nach Anwendung des Koch'schen Mittels, auftretenden Reactions erscheinungen. *Rosenbach* in Breslau.
(*Deutsche Med. Woch.*, Nos. 49 and 50, 1890.)

Histologisches über die Wirkung des Koch'schen Heilmittels gegen Tuberculose, von *Kromayer*, in Halle. Ebenda.

Demonstration der vorläufigen Ergebnisse der Versuche mit dem Koch'schen Mittel gegen Tuberculose in den allgemeinen Krankenhäussen in Hamburg, von *Kast*, *Schede*, *Maes*, and *Thost*. Ebenda.

Die Methoden der praktischen Hygiene, von *Prof. K. B. Lehmann*, in Würzburg. (New book.)

Les Microbes de la Bouche, par *Dr. Th. David*, in Paris. (New book.)

Einführung in das Studium der Bakteriologie, &c., von *Dr. Carl Günther*, in Berlin. (New book.)